9^{th} EDEN Research Workshop

Forging new pathways of research and innovation in open and distance learning

Reaching from the roots

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Airina Volungeviciene, András Szűcs and Ildikó Mázár
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Editors:

Airina Volungeviciene
András Szűcs
Ildikó Mázár

Editorial co-ordination:

Kriszta Mihalyi

EDEN Secretariat, c/o Budapest University of Technology and Economics
H-1111 Budapest, Egry J. u. 1, Hungary
Tel: (36) 1 463 1628, 463 2537
E-mail: secretariat@eden-online.org
http://www.eden-online.org

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Introduction

Distance education is the fastest-growing mode of both formal and informal teaching, training, and learning. It is multi-faceted in nature, encompassing e-learning and mobile learning, as well as immersive learning environments.

Research questions should be posed within a theoretical framework and, most commonly, quality research is embedded within a holistic structure of research areas within a discipline. Furthermore, the structure, culture, history, and past accomplishments of a research discipline form the foundation for identifying gaps and priority areas for researchers.

Over the last decade, e-learning and distance education has developed rapidly in the higher education sector. Today, there is almost no higher education institution that does not utilize e-learning in blended learning programs or at least in addition to on-campus lectures and labs.

Online distance education has moved from the periphery into mainstream higher education (Online distance education: Towards a research agenda – Zawacki-Richter, Anderson 2013).

Building on the success of the latest such conference in Oxford in 2014, EDEN is organising its 9th Research Workshop in collaboration with the Institute of Education and the Center for Lifelong Learning at Carl von Ossietzky Universität Oldenburg in Oldenburg, Germany.

Research into distance education has renewed importance and taken on new dimensions, as open, distance, and online learning further merge with the mainstream of education. Changes are occurring at all levels of institutions: from new systems and theories and ways of leading and managing organizations, to new teaching and learning approaches and technologies.

The history of online and distance learning (ODL) is rich with principles, theories, and concepts that still apply today, but which are often forgotten in the haze of avant-garde technology. As researchers of ODL, these historical roots ground and guide us in forging new paths of teaching and learning with technology. How do we bring together the strengths of the past with the opportunities for the future? How can we build on our knowledge and experiences to create informed and innovative pathways for the future? Which new pedagogic paradigms are emerging and have the potential to impact the future of ODL?

The massive recent and cumulated achievements of research in online and distance education meanwhile have mostly been ignored. Paying attention to what is already known about learning in online and virtual spaces, to how the role of educators and learners is transformed and how social networks extend a learning network may enable mainstream MOOC providers to make evidence-based decisions in favour of educational reform (George Siemens 2013).

The 2016 EDEN Research Workshop in Oldenburg brings together researchers from all walks of life and provides a platform for engaging in discussion and debate, exchanging research ideas, and presenting new developments in ODL, with the goal of creating dialogues and forming opportunities for research collaboration.

Airina Volungeviciene
President,
European Distance and E-Learning Network

Lisa-Marie Blaschke
Carl von Ossietzky
University, Oldenburg

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Airina Volungeviciene, EDEN President, Vytautas Magnus University, Lithuania;
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TOWARDS A FRAMEWORK FOR VIRTUAL INTERNATIONALIZATION

Elisa Bruhn, Carl von Ossietzky University Oldenburg, Germany

Summary

Digitalization, internationalization, and an expansion of flexible distance provision are among the trends which the higher education landscape is experiencing in many countries today. At the intersection of these trends, the traditional boundaries between distance and conventional education are becoming blurred (Guri-Rosenblit, 2014; p.114; Naidu, 2003; p.350), with distance and on-campus education both embracing online learning that can be accessed easily from anywhere on the planet. Virtual transnational education (TNE) and massive open online courses (MOOCs) are prominent examples of higher education crossing borders (Knight, 2016; p.328). Furthermore, the aim to internationalize the curriculum is playing an increasing role in traditional and distance education today. Institutions, instructional designers and instructors have stepped up efforts to internationalize the on-campus classroom as well as distance education with the help of information and communications technology (ICT). These efforts find their expression, for example, in attempts to introduce intercultural awareness into online course development (e.g. Gunawardena, 2014), as well as in virtual mobility and collaborative online international learning (COIL) projects in on-campus higher education (e.g. Guth, 2013). In an endeavour to conceptualize the abundance of approaches aiming at internationalizing higher education via virtual media, this paper proposes an approach to formulating a comprehensive framework for *virtual internationalization* by focusing on its global, intercultural, and international dimensions.

Conceptualizing virtual internationalization

The internationalization of higher education has changed its nature in recent years. Gone are the days when the idea was practically synonymous with the physical mobility of students. The emergence of concepts focusing on the possibilities of internationalization *at home* (IaH) or *of the curriculum* (IoC) (Beelen & Jones, 2015) points to an increasing awareness that internationalization is not necessarily limited to university members crossing physical borders. Instead, certain curricular activities on campus or online have been developed to complement or substitute physical mobility (de Wit & Hunter, 2016). In the course of such development, with the research fields of digitalization and distance education playing their part, virtual forms of internationalization have gained importance in on-campus and distance education alike.

Scholars have recently conceived concepts such as virtual mobility, globally networked learning (GNL), virtual exchange, telecollaboration, and collaborative online international learning (COIL), to name a few (Guth, 2013; UNICollaboration, 2014). These concepts are commonly used to label facets of internationalizing on-campus education at the classroom or program (micro) level, and have proven useful in advancing the idea of virtual forms of internationalization. However, they generally do not provide a comprehensive model of virtual internationalization that could be applied on the macro-, meso-, and micro levels of both online and on-campus higher education, and from the classroom to the national or sector level. Yet, virtual internationalization expands the possibilities of internationalizing higher education in many ways – being more than virtual mobility only, just as internationalization is more than mobility only.

The term *virtual* has been defined, for the computer context, as "not physically present as such but made by software to appear to be so from the point of view of a program or user" and as "established or conducted using computer technology" (OED Online, 2013). Hence, reformulating Knight's widely accepted definition of internationalization, the term *virtual internationalization* can be understood as follows:

> Virtual *internationalization at the national, sector, and institutional levels is defined as the process of introducing an international, intercultural, or global dimension into the delivery, purpose or functions of higher education* with the help of information and communications technology (ICT). *(own definition, based on Knight (2003; p.2) (modifications emphasized))*

Thus, by simply including mention of information and communications technology (ICT) into Knight's broad definition, the resulting definition of *virtual internationalization* is comprehensive enough to cover all kinds of ICT supported measures and processes at different organizational levels, as well as the delivery, purpose and functions of higher education. The foundations for this endeavour are laid in this article, by approaching the required framework from the three dimensions mentioned in the definition: global, intercultural, and international.

The global dimension

The global dimension of internationalization is described by Knight (2004) as referring to "worldwide in scope and substance … [while] not highlight[ing] the concept of nation" (p.8). The discussion of this aspect includes activities of higher education institutions that have a worldwide or part-world (Marginson, 2011; p.12) reach, as well as those that aim at introducing a global dimension into the *at-home* curriculum. The part-world aspect may, for example, refer to developing countries in which HEIs of the "developed world" pursue some kind of "global engagement" (Marginson & van der Wende, 2007; p.20).

The phenomenon of *worldwide reach* is the first to be addressed in this paper. Marginson (2011) suggests speaking of the *glonacal* era of higher education, distinguishing three levels that influence and affect each other: *glo*bal, *na*tional, and lo*cal* (p.13). The virtual delivery of

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programs, in his view, can contribute to the global dimension of higher education, especially because of the potential to take "higher education straight from the local to the global dimension" (p.22), bypassing the national level. Of course, the adoption of necessary national and international frameworks and agreements (such as the General Agreement of Trade and Services – GATS) is a prerequisite for such worldwide reach to rise to its full potential (Marginson & van der Wende, 2007).

Higher education institutions and consortia, as well as private providers have discovered globally available higher education as a growth market, and have started offering online degrees and certificates worldwide. MOOCs and MOOC providers such as Coursera, Udacity, and Iversity are further examples working at the global scale. In fact, having been unknown to most only a few years ago, MOOCs are now being considered and applied by many institutions around the world as a valid internationalization instrument (Knight, 2014; p.49). These examples demonstrate that distance education providers have the potential to transcend national borders, enrolling massive numbers of students from almost any location worldwide (Gunawardena, 2014; p.75; Guri-Rosenblit, 2014; p.119). However, Amirault and Visser (2010; pp.23-24) show that virtual program offerings do not *automatically* cross borders, nor result in the same effects everywhere. Virtual universities have not always been successful – the most important reasons are presumed to lie in the incapacity to appeal to the global target groups, in quality and intercultural issues, and in political factors (Marginson & van der Wende, 2007; p.10, p.42).

What is more, in spite of their theoretical potential of worldwide reach, many online distance programs are targeted at a domestic market (Sadykova, 2012; p.2), and the ratio of students enrolled in these courses while living abroad is low in many countries. In the United States in 2014, for example, just over 1.3% of students taking exclusively distance education courses offered from the United States resided abroad (Snyder, de Brey, & Dillow, 2016). Of course, there are students from everywhere in the world who live *within* a certain country that need to be taken into consideration. One distinctive example is Kiron based in Germany, which, in collaboration with traditional higher education institutions and their on-campus programs, offers online higher education for refugees, thus opening up German education to a global clientele who live within the country.

In any case, be it in- or out-of-country provision, be it online distance or on-campus education, the next step is to follow Amirault and Visser (2010) in asking: "The question … is not just *Do we have international participants?*, but rather, *Do we have internationalized learning environments?*" (p.28, emphasis in original). This leads to the second aspect in this section, namely introducing a *global* component to the *at-home* curriculum. Rephrasing the quote by Amirault and Visser, one could ask: In what ways can ICT help to introduce a global dimension into all kinds of programs in higher education? Is it not so that many institutional mission statements and national higher education internationalization strategies aim to prepare students to live in a *globalized world* in which they are being challenged to become *global citizens* and foster *global understanding*, thereby contributing to the *global knowledge*

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society as inhabitants of the *global village* (cf. Teichler, 2004; p.23)? Indeed, scholars have identified a shift towards an "approach to internationalisation that sees the principal outcome of international education as educating graduates able to live and work in a global society" (de Wit & Hunter, 2015; p.51). Internationalization, in this sense, does not mean only the enrolment of students from anywhere in the world (either domestically or via forms of globally available education); it includes the aspect of introducing a *global* component into the *at-home* curriculum in on-campus and online distance education alike.

The intercultural dimension

Regarding the intercultural dimension of virtual internationalization, two aspects will again be addressed in this paper: The first is the attempt to provide an interculturally adequate classroom to facilitate the same quality of learning for all students, however interculturally diverse they may be (Edmundson, 2009). The second aspect is the effort to foster increased intercultural competence of participants.

Investigating questions that revolve around interculturally sensitive online classrooms, scholars have examined culture and intercultural learning in virtual environments in different ways. One approach is to ask about learners' and instructors' diversity and *cultural differences*, which are generally perceived as essential to their nationality, ethnicity, or other significant cultural characteristic. Often influenced by the works of authors such as Geert Hofstede or Edward Hall, insightful results on learners from different cultural backgrounds have been obtained by, for example, M. Wang (2007) and Mishra (2011). Another approach is to focus on *cultural resemblances*, perceiving an increasing portion of learners in the online classroom as *digital natives*, members of a global *cyberculture*, etc. Palfrey, in an e-mail to his colleague Gasser, envisions an emerging global culture with the information network of the Internet at the source of an intensification of cross-cultural exchanges, the benefits of which by far exceed those of student exchange programs (Palfrey & Gasser, 2008; pp.274-275). A third approach is to understand culture in the online classroom as being constructed (or negotiated) (Gunawardena, 2014; p.83), in other words, as a *third culture* (Raybourn, Kings, & Davies, 2003; p.106). This perspective follows the assumption that learners and instructors bring their experiences, their types of socialization, and their culturally formed learning and teaching styles into the online classroom, parts of which the others may share, and part of which they do not. In the virtual space, then, there is the potential – not the automatism! – that a *new cultural amalgam* (Ess, 2009; p.18) can be created among participants.

It has been argued that instead of an equalizing cyberculture emerging naturally in online education, it is necessary to provide a culturally sensitive classroom (Gunawardena, 2014; O'Mahony, 2014). Yet, the solution cannot reside in "duplicat[ing] the learning environment from the learners' home culture. Rather, the purpose is to build mutual accommodation and respect for the culture of others in order to reach academic success" (Wang & Reeves, 2007; p.10). This may prove necessary, especially because differences encountered in the online classroom may be less obvious than in face-to-face classrooms, and because they are not limited to evident ones such as language. They can also be hidden in culturally influenced

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learning styles, values, or even religious influences (Edmundson, 2009). As this is obviously no easy task, it has been suggested that development programs for faculty and support personnel should be provided (Boubsil & Carabajal, 2011; p.12).

The second aspect of the intercultural dimension to be discussed in this section is the fostering of learners' *intercultural competence*. This term can be understood to be:

> *… the appropriate and effective management of interaction between people who, to some degree or another, represent different or divergent affective, cognitive, and behavioral orientations to the world. … The extent to which individuals* manifest *aspects of, or are influenced by, their group or cultural affiliations and characteristics is what makes an interaction an* inter*cultural process. (Spitzberg & Changnon, 2009; p.7, emphasis in original)*

Intercultural competence, in this sense, is required of people interacting with others who manifest features of a culture that differs from their own. It has been argued that any intergroup interaction has this affordance, since intercultural differences are related not only to nationality, but also to characteristics such as ethnicity, religion, or region (Spitzberg & Changnon, 2009; p.7). In the virtual space, there is reason to believe that establishing this kind of competence requires approaches that are different from those that can be applied in physical encounters. This is particularly true when communicating via asynchronous textual tools, because visual cues and immediate feedback are lacking (Sadykova, 2012; p.41). On the other hand, scholars have also valued the potential of bringing intercultural learning into online education because of the possibility to draw benefit from the multicultural composition of many (if not all) online classes (Ess, 2009; p.25). As Knight (2004) puts it: "We know that internationalization is also about relating to the diversity that exists within countries, communities, and institutions" (p.11).

The international dimension

Again, two aspects of the topic under discussion are presented in this section. The first deals with the international reach of higher education, and the second with international curricula. In contrast to the *global* dimension, which describes phenomena and processes transgessing the national level without highlighting the concept of nation, the *international* dimension is characterized by a limited number of countries that may be involved.

The aspect I will discuss in the context of international reach is transnational education (TNE) and specifically, *virtual TNE*. TNE has been defined as "[a]ward- or credit-bearing learning undertaken by students who are based in a different country from that of the awarding institution" (O'Mahony, 2014; p. 8). In this sense, virtual TNE refers to those cross-border programs that are delivered via distance provision. In practice, many TNE programs today offer a mixed delivery mode of blending distance learning with on-campus elements – for example, through support structures or twinning models (Ziguras, 2008; p.644). Virtual TNE is a growing market: "Rapid advances in the Internet, multimedia, and e-learning technologies provide increasing support for the adoption or expansion of distance learning technologies as

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a delivery method for transnational education" (Boubsil & Carabajal, 2011; p.6). It is therefore estimated that the demand for international higher education will continue to grow, and that the online, distance delivery of TNE will play an increasing role in the future (de Wit & Hunter, 2015; p.49; Knight, 2016; p.334).

Coming to the second aspect of this section – international curricula – I will focus on the concept of *virtual mobility*. Of course, there are other facets that this aspect may encompass, including (but not limited to) virtually assisted foreign language or area studies (de Wit & Hunter, 2015; p.42; cf. also Leask, 2015). Exemplarily, this section concentrates on the "buzzword" virtual mobility, which requires special attention in order not to be confused with virtual internationalization as a whole. The term can be understood as a physical international experience being complemented or substituted by a virtual component (Leask, 2015; p.19). While with virtual TNE, a whole program moves abroad, virtual mobility can be applied to essentially any curriculum, be it online distance education or on-campus delivery. Collaborative online international learning (COIL), established at the State University of New York, is an example of an especially successful model of virtual mobility. Bringing classes from two (sometimes more) countries together online, the COIL method "promotes interactive shared coursework, emphasizing experimental learning and gives collaborating students a chance to get to know each other while developing meaningful projects together" (Guth, 2013; p.2). While some argue that COIL is the more accurate term than virtual mobility (de Wit, 2013), it may be advisable to retain the former. The term *virtual mobility* opens up the possibility to include international virtual experiences that are not necessarily grounded in collaboration, but provide other forms of virtual travel, including *virtual field trips* (cf. e.g. http://www.georama.com/berkeley-college/), and *virtual internships* (Vriens & van Petegem, 2011). For a more profound discussion of different forms of virtual mobilities, cf. Urry (2007). In fact, many scholars see virtual mobility as "one of the most flexible, versatile and inclusive approaches in the provision of international experience opportunities" (Villar-Onrubia & Rajpal, 2016; p.75; cf. also MOVINTER, 2010). And the founder of the German MOOC provider Iversity envisions virtual student exchanges modelled on the European program ERASMUS – an "online ERASMUS for all" (Klöpper, 2014).

Conclusion: Towards a framework for virtual internationalization

In this paper, I have investigated three potential dimensions of virtual internationalization. Each time, two perspectives have been taken: The first concerns the involvement of a global, intercultural, or international *clientele* or *reach*. The second considers a global, intercultural, or international *curriculum.*

The considerations of this paper have shown that the concept of *virtual internationalization* has potential in all three dimensions, going far beyond the 'buzzword' of *virtual mobility*. In order to conceptualize a comprehensive model of virtual internationalization, it will be necessary to further investigate its manifestations and potentials at the micro, meso, and macro levels. This paper has provided a stepping stone for this endeavour.

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TOWARDS DESIGNING AN OXFORD EXPERIENCE IN AN ONLINE DISTANCE PROGRAM

Jill Fresen, Xavier Laurent, University of Oxford, United Kingdom

Summary

This paper describes the methodology and findings of a project to design and develop an online distance program at the University of Oxford (UK). The program is one of the first to be offered almost entirely at a distance, for a core qualification at the University, as opposed to professional development courses. The aim of the project was to investigate how to design an online, distance learner experience that mirrors the Oxford face-to-face experience as closely as possible, for the newly launched Oxford Online Programme in Sleep Medicine (OPSM). The main challenge was for this research-intensive, face-to-face university to adopt flexible and distance learning methods, with little prior experience in doing so. The programme will launch in September 2016 with 20 to 30 students. Ongoing evaluation of the programme will reveal whether or not the team has been successful in its aim.

Introduction

Until recently, the world-renowned and traditional Oxford University in the UK had offered very few fully distance courses, and then mostly short courses located in the Department for Continuing Education (ContEd). Although the Continuing Professional Development section of ContEd offers an MSc in Evidence-Based Health Care, a Diploma in Infectious Diseases and other professional development courses at a distance, these usually require a significant amount of face-to-face contact time, in the form of *Oxford weeks*. The University's centralised learning management system (LMS) (branded *WebLearn*) is used to support blended learning in the traditional face-to-face model.

Oxford University launched a Digital Education Strategy in 2016 (University of Oxford, 2016) which aims to enable the University to realise "expressed aspirations for a more technology-enhanced approach to teaching" (p.2). The University already "makes accessible a huge range of open education resources (OERs) in the form of audio and video recordings and teaching resources for schools" (p.15). For the time being, Oxford University is not offering Massive Open Online Courses (MOOCs), although the Digital Education Strategy group gave particular attention to this possibility. There are many factors behind this decision, not least the desire to see how MOOCs evolve, in the light of their evident low student completion rates (Harvard University, 2014). Alternative activities, such as offering online distance courses for registered Oxford students using our existing LMS, are being pursued in order to broaden access and expand our face-to-face provision (University of Oxford, 2016).

This paper presents work done between learning technologists in the central Technology-Enhanced Learning (TEL) group, a lead technologist in the Medical Sciences Learning Technologies group, and an academic department in introducing a new online distance programme in Sleep Medicine as from the 2016/17 academic year (Nuffield Department of Clinical Neurosciences, 2016).

Context – Oxford teaching and learning model

As is well-known, the teaching and learning model at Oxford University is traditional and extremely individualized, due to manageable student numbers. Undergraduate students are under the care and mentorship of a tutor throughout their degree. A *tutor* at Oxford is usually a professor and a respected scholar in their field. The tutor provides weekly support and consultation to their mentees, in small groups. All Oxford students are expected to be independent, self-directed learners and to take responsibility for their own studies. During term time, series of lectures are presented, but attendance is optional; hence the phrase *reading for your degree* – students need to take advantage of all opportunities, advice and materials available to them, and craft their own pathway through their studies.

There are two technology-enhanced learning teams to support the use of digital technologies for teaching and learning in the University – one in the central Technology-Enhanced Learning team and one in the Medical Sciences division. The latter team worked very closely with the departmental course team throughout the process of planning the program, writing the business plan, gaining central University approval, and suggesting technologies such as the institutional LMS and Webex. They were also able to assure the department that they will continue to provide long-term support as the program rolls out and continues to evolve. Both teams of learning technologists continually make efforts to engage academics in using technology tools effectively, and optimising use of the LMS to provide learning pathways besides being a content repository (Laurent et al., 2016).

Aims

The aim of this project was to investigate how to design an online, distance learner experience that mirrors the Oxford face-to-face experience as closely as possible, for the newly launched Oxford Online Programme in Sleep Medicine (OPSM).

An internally-funded project, the *WISE project* (WebLearn Improved Student Experience) enabled the learning technologists to work closely with the academic department to design and develop the first online distance programme offered by the central University.

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Rationale for distance learning: Oxford online programme in sleep medicine

According to Roe (2010), "New technologies especially in rich multimedia and asynchronous communication methods allow for increased learning opportunities" (p.70). This is particularly true for busy adult learners studying at a distance, who can make use of learning management systems, social media and online resources at a time and place that suits their work, home and family commitments.

For most professionals and lifelong learners, the principal obstacles to continuing education are constraints of time and location. An online programme permits flexibility to set aside time for personal study when it suits them. Likewise, synchronous seminar groups can be arranged to match particular time zones, enabling participants to join these from home or work. This kind of flexibility assists students to find a pattern that works for them. There is also flexibility in the new programme in other ways. The modular approach allows students to take a Diploma (8 modules), or an MSc (10 modules plus dissertation) (Figure 1). Indeed, it is also likely that there will be demand from some professionals to take only one or two modules for purposes of continuing professional development (CPD).

Oxford online programme in Sleep Medicine (OPSM)

In 2014 Oxford University approved a brand new postgraduate programme in Sleep Medicine. The two-year Online Programme in Sleep Medicine (OPSM) leads to a Postgraduate diploma (PGDip) or a Masters degree (MSc). The programme is hosted by the Sleep and Circadian Neuroscience Institute (SCNi), at the University of Oxford which "brings together world leading expertise in basic and human sleep and circadian research and in the evaluation and management of sleep disorders" (Nuffield Department of Clinical Neurosciences, 2016).

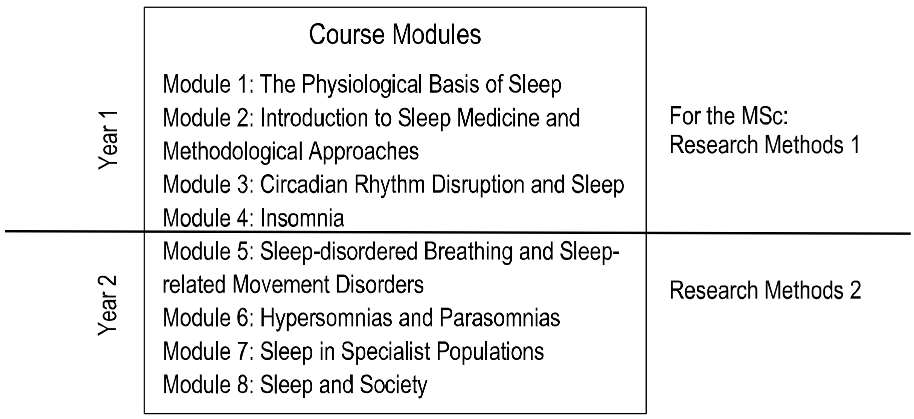

Figure 1. Structure of the Oxford OPSM (from Nuffield Department of Clinical Neurosciences, 2016)

The course is almost entirely online, although students are expected to attend a one-week summer school during their two-year period of study. Besides written learning materials and online discussion groups, students will have access to pre-recorded video lectures presented

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by a group of specialist academics from Oxford, as well as contributions from international experts. Each of the 8 course modules will include synchronous webinars which will be scheduled to accommodate the different time zones of students on the course. The learning model for the OPSM includes the following methods and media:

- Course websites in the LMS;
- Reading materials;
- Pre-recorded lectures;
- Weekly live webinars;
- Weekly online discussions;
- Online quizzes;
- Assessment: eight extended essays;
- 1-week summer school;
- Dissertation (MSc).

Learning technologists are involved in building the portal and online courses on the institutional LMS; at a later stage they will also be involved in designing and developing interactive simulations and animations which the subject matter lends itself to. The development team has tried hard to design a program that comes close to imitating the personalized Oxford learning experience. This will be achieved through small student groups, moderated online discussions, live webinars and collaboration with subject specialists to reflect the most recent research findings. A challenge was to organize the logistics of the program without prior experience in offering online distance learning courses. For example, time and effort were required to identify the best technologies and skills required to conduct synchronous sessions for students in extreme time zones.

Methodology – the WISE project

Central funding for the WebLearn Improved Student Experience (WISE) project enabled the appointment of two additional learning technologists to provide close support to a limited number of academic departments in rethinking and redesigning their course materials in the LMS. The Oxford OPSM was one of the programmes identified to benefit from this dedicated support.

The WISE project uses a design and development methodology consisting of 5 stages: Gathering requirements, Prototyping, Building, Launching and Evaluating (Figure 2).

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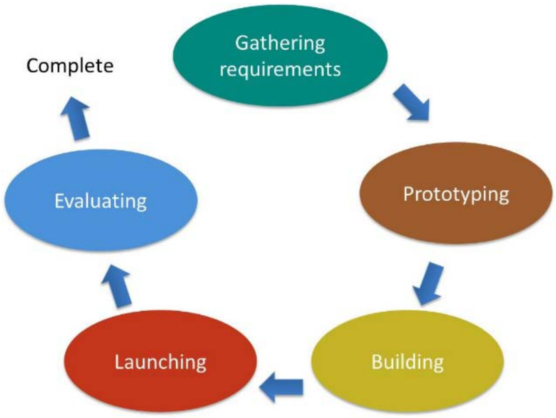

Figure 2. WISE project methodology

Time is spent with the academic department to identify their needs and requirements, after which the central team builds one or more prototype course areas in the LMS. Roles and responsibilities are clearly defined, including the need for the department to build their own content into their prototype areas and launch them prior to the start of term. The *Evaluating* stage refers to usability evaluations conducted with students – either one-on-one observations or focus group sessions – which produce suggestions for usability improvements.

The OPSM is currently in the *Building* phase, to be ready in time to launch in September 2016.

Findings

1. The design team for the OPSM was particularly keen to employ aspects of *personalization*, e.g. showing students only material that is relevant to them, at the appropriate time (depending on current module, week etc.). This goal was in keeping with our attempt to imitate the *Oxford experience* as closely as possible. Not surprisingly, we found that the institutional LMS is not designed as an environment to present fully online, personalized, adaptive content. According to the Horizon Report (2016), adaptive learning is expected to be adopted by higher education institutions in the near future – as evidence of the trend in the increasing use of blended learning designs. In our project, additional programming expertise was required to present the online course in a more sophisticated, responsive *front end* (Figure 3).

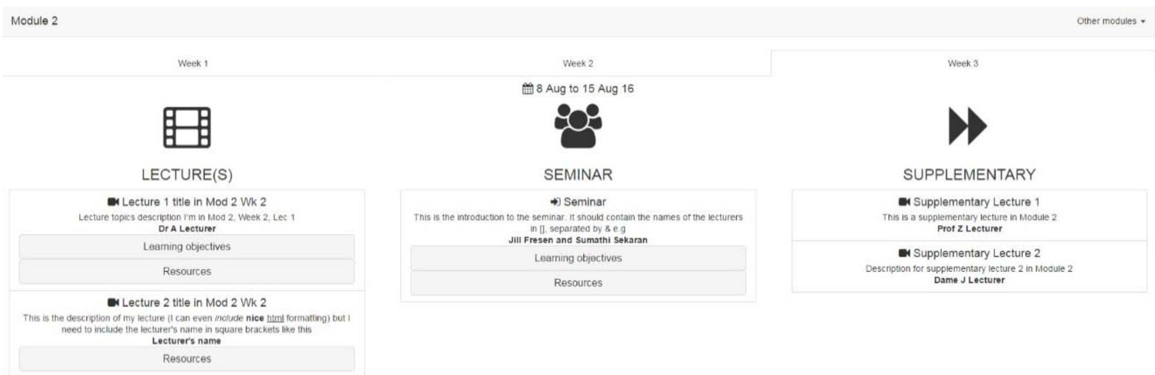

Figure 3. Screenshot of the modified LMS interface to enable personalization.
It was designed with the Angular 2 framework to surface content from the Oxford LMS

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2. In the structure of the online modules, we use the *Lessons tool* which offers the pedagogical advantage of tailoring a learning pathway for the students, with integrated content, relevant activities and assessment opportunities (Laurent et al., 2016). However, we found that the link to the interactive version of a particular recorded lecture can only be embedded within Lessons pages if the recording is public (but that has licence and cost implications). This is due to the current integration between the LMS and the lecture capture software used by the University being "light" LTI (learning tools interoperability) integration, as opposed to a "deep integration". Thus, at the current time, only the exported .mp4 versions of recorded lectures can be embedded within learning pathways. The alternative of providing a link to a folder of all the recorded lectures would deviate from the preferred pedagogical learning pathway.
3. It was not surprising to find that academics who are used to presenting traditional face-to-face lectures are hesitant to change their thinking and adapt to online distance learning techniques. The literature shows that the optimum length for recorded lectures in an online course is 3 to 6 minutes (Guo et al., 2014). However, lecturers on the OPSM have decided that they prefer to record a 1-hour lecture, and if they want the students to pause it and participate in an activity, they will say within the lecture: "Now pause the recording and do an activity, then return here later". One newly-appointed academic who will teach the research methods modules is interested in exploring more interactive ways of teaching, e.g. peer assessment, using social media, student-generated content (student pages), and interactive simulations.

Implications

One of the factors that previously hindered the development of distance courses at the University of Oxford is that the assessment model is still largely paper-based. Students either write formal examinations under examination conditions, or are required to submit paper-based summative essays in person at what is called the Examinations Schools, located on the High Street in the city of Oxford. Although the Medical School runs over 50 formal University exams online every year, the central academic boards were not happy to do so at a distance, for reasons of information and identity security.

Thus any online assessment strategy needs to consider the best way of assessing the breadth and depth of a student's learning, and enabling the online submission of summative work. The OPSM has elected to offer eight 'extended essays' and to require the students to present themselves for one-week of contact time during the two-year program.

During the course of the WISE project, additional design and support resources were available. However, the department and the local learning technology group in Medical Sciences need to consider the resource requirements to build further online content and maintain the course sites once they are live. Other departments wishing to follow a similar approach may consider employing a part-time learning technologist for this purpose. However, a candidate would need to have the right balance of skills, including writing code for online simulations and maintaining the code for the personalized skin.

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Conclusion

Collaborative work between learning technologists in the central University Technology-Enhanced Learning group, a lead technologist in the Medical Sciences Learning Technologies group, and the program team in the academic department has been effective in designing and developing an (almost) fully online distance programme at the traditional, research-intensive Oxford University. With the aim of providing an experience that emulates the traditional face-to-face model of support and interaction, the team faced challenges relating to time zones, and institutional systems that are not necessarily designed to be responsive and adaptive. The OPSM will launch in September 2016 with 20 to 30 students. Ongoing evaluation of the programme will reveal whether or not the team has been successful in its aim.

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EMERGENT EVALUATION: AN INITIAL EXPLORATION OF A FORMATIVE FRAMEWORK FOR EVALUATING DISTANCE LEARNING MODULES

Palitha Edirisingha, Phil Wood, University of Leicester, United Kingdom

Summary

Evaluation of student learning is becoming increasingly important in higher education, partly as a consequence of increasingly performative structures within universities, and partly as the result of a developing interest in rolling development of curricula and teaching resources. Historically, for both face-to-face provision and distance learning, such evaluation has generally been captured through the use of end-of-module questionnaires. Whilst these evaluative media may capture some reflections of student learning, they are often poorly focused, and rely wholly on summative perspectives which are captured at a point remote to the learning process itself. The current paper reports on an initial investigation which centred on developing a formative framework for evaluating distance learning modules. It is distinguished from typical summative questionnaire evaluations by the collection of *live* feedback from students as they undertake a module, allowing for insight and feed forward to develop materials as students undertake the module. This is achieved by using a modified version of an approach called 'Lesson Study', a collaborative planning and evaluation tool which originated in Japan (Lewis et al, 2009).

Developing an approach to evaluation of distance learning

The evaluation of modules in higher education is an important driver for change and curriculum development. The standard tool used in evaluating student experience is the summative questionnaire which students are asked to complete at the conclusion of a module. These questionnaires often cover a spectrum of issues including reflections on activities, tutoring, resources, and environments, but rarely cover student learning. The statements are often general in nature, e.g. "what was the quality of learning resources?" which lead to over-simplified responses which cannot pick up the nuance of experiences. As such, there are a number of issues with the accuracy and utility of summative questionnaires. Firstly, many students, especially on distance learning courses, do not bother to fill in the questionnaires, either because they are busy professionals, or because they are happy with their experiences so do not value the opportunity to share their views. Secondly, questionnaires are inherently retrospective, which leads to over-simplification of views, and also leads to future developments being undertaken after the students have finished their learning. Finally, the analysis of questionnaire data is often reductive, leading to numeric summaries, with little explanatory or discursive insight into the complexities of the activities undertaken.

These restrictions are recognised within the literature already (Wachtel, 1998) and have led to the development of alternative approaches in an attempt to gain a better evaluation of learning, whilst also developing the curriculum. For example, Ellery (2006) developed a multidimensional evaluation framework for use on a campus-based course on data analysis in social science research methods. The approach not only gathered information from students, but also captured lecturer perspectives in an attempt to create a more complete picture of student experience and learning. A number of methods were used to capture evaluative data that were then used to inform curriculum and pedagogic development. Benson et al. (2009) extended the idea of formative evaluation further by developing a participatory evaluation model, that again was multi-modal, based on the work of Jackson and Kassam,

> *"a process of self-assessment, collective knowledge production, and cooperative action in which the stakeholders in a development intervention participate substantively in the identification of the evaluation issues, the design of the evaluation, the collection and analysis of the data, and the action taken as a result of the evaluation findings." (Jackson & Kassam, 1998; p.3)*

Here, students were involved in identifying the terms of evaluation before being involved in data capture and interpretation. This made them and lecturers joint investigators into their own work, and gave a sense of joint responsibility for improving modules and learning. However, in both cases, these alternative approaches were developed within campus-based contexts. In this investigation, we attempted to develop a model which could be used in distance-learning contexts.

Aims of the pilot study

This investigation was undertaken on a distance-learning MA in International Education course. The programme includes a 30 credit module on research methods, the second module of four which make up the first 120 credits of the masters course. We decided to focus on this particular module as it has been identified as one which students struggle with and which often leaves them with poor and incomplete understanding. In developing an evaluative process, we wanted to create an approach which allowed for:

- diagnostic and formative module evaluation;
- a clear link to curriculum development;
- a framework for distance learning review which is more than a *performative* activity;
- putting pedagogy (interpenetration of teaching, learning, curriculum and assessment and their interaction with teachers and students) at the centre of the process;
- emergence and trialling of new approaches as a standard element of our work.

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Outlining the evaluative framework and pilot data collection

In an attempt to develop a formative approach to module evaluation, we decided to attempt to use a variant of lesson study (Lewis et al., 2009), a framework which attempts to help teachers improve their pedagogy by working collaboratively to improve student learning. Lesson study has been a core feature of educational development in Japan for over 100 years. Since the end of the 20th century that it has moved beyond Japan, and is now a well-established method for pedagogic development in countries around the world. It is a collaborative form of action research (Wood et al., 2016), which cannot be undertaken by individual tutors. A basic cycle of lesson study is given in Figure 1, and begins with a group (as few as two will work) of teachers coming together to identify a *learning challenge*. The learning challenge is a specific element of learning that students struggle with, and often fail to understand well. Having identified such a challenge, the group then work together to plan a lesson which engages with the elements of that challenge to create a pedagogic experience which will help students gain a greater level of understanding. This requires the teacher group to spend time considering not only the teaching element of the lesson, but also the learning of the students. How will they engage with and make sense of the subject matter? How will particular activities be understood and completed?

Once the lesson is planned and resourced, one member of the group teaches the lesson, whilst the other members observe a number of students. The observations focus on trying to note how students react and make sense of the lesson material. Once the lesson has finished, the teacher group reconvenes to consider the evidence for student learning and the degree to which the lesson has helped them move forward in their understanding. If there is the opportunity, a second lesson can be taught again to a parallel group, making amendments to the original lesson where necessary, to maximise the level of pedagogic insight gained from the process.

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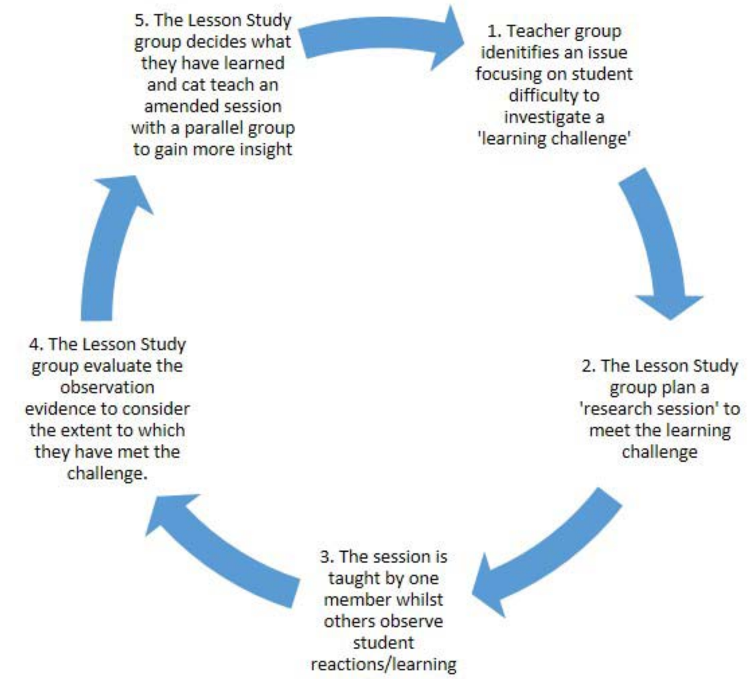

Figure 1. A basic lesson study cycle

To date, lesson study has only been applied in face-to-face contexts, in large part due to the school-based context within which the vast majority of lesson study takes place. We decided that we would develop a modified version of this approach as the basis for developing and evaluating student learning as it occurred within a distance learning module. Our research was undertaken with three students who were undertaking the research methods module, and did so using an amended version of the cycle in Figure 1. A central element of the lesson study approach is the observation of the research lesson, an activity which obviously does not translate directly to a distance learning context. However, where appropriate, the use of discussion board dialogue might stand in place of this element of the cycle. We decided to use individual semi-structured stimulated recall interviews (Lyle, 2003) as the main source of evidence for approaches to, and levels of, learning in place of observations, and hence the amended lesson study cycle looked like that given in Figure 2.

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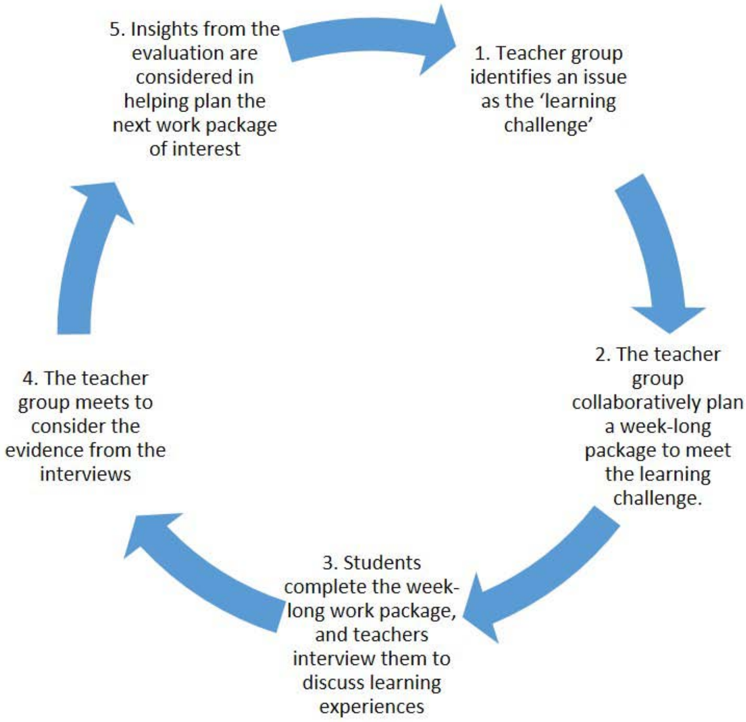

Figure 2. Modified lesson study cycle for distance learning contexts

This cycle was used to investigate two areas of the research methods module which often cause problems in student learning:

- developing research questions;
- organisation, analysis and interpretation of data.

Having completed these two cycles of investigation, we decided to include an extra step in the process, based on research in lesson study at higher education level (Wood & Cajkler, 2016). In a final, third, cycle which focused on the development of critical writing in student work, we included a step before the first planning meeting which consisted of individual interviews with the three students to investigate their understanding of some of the key concepts of critical writing, and to ascertain the pedagogic approaches they preferred when learning online. This amended cycle is shown in Figure 3.

The module lasted for 16 weeks, with the three cycles of modified lesson study occurring at weeks 2, 7 and 12 (see Figure 4). In addition, general individual interviews were undertaken with the three students at the beginning, middle and end of the module, and the final assignments of the students were analysed. The intention of using this model was to help us to develop a deeper understanding of what students believed they were learning, but also how they were making sense of the module materials. As such, this gave us an opportunity to evaluate, amend and develop approaches as the module unfolded (hence the idea of an emergent approach). The approach also allowed us to gain ideas and insights from each other as tutors as we developed the module together.

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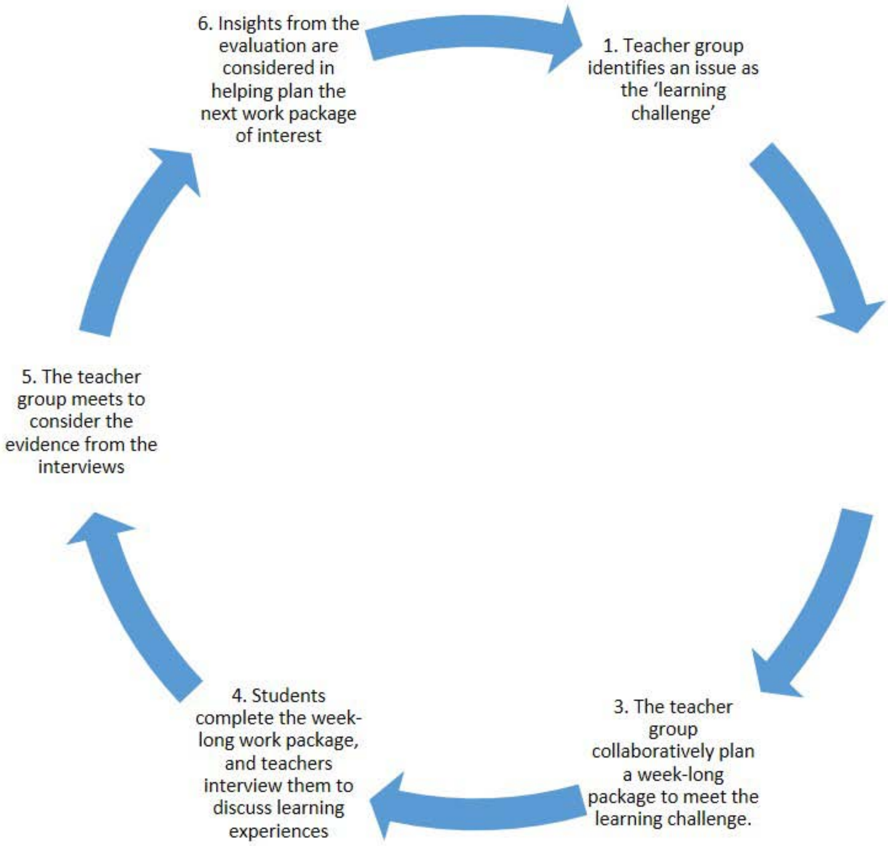

Figure 3. Enhanced modified lesson study cycle for distance learning contexts

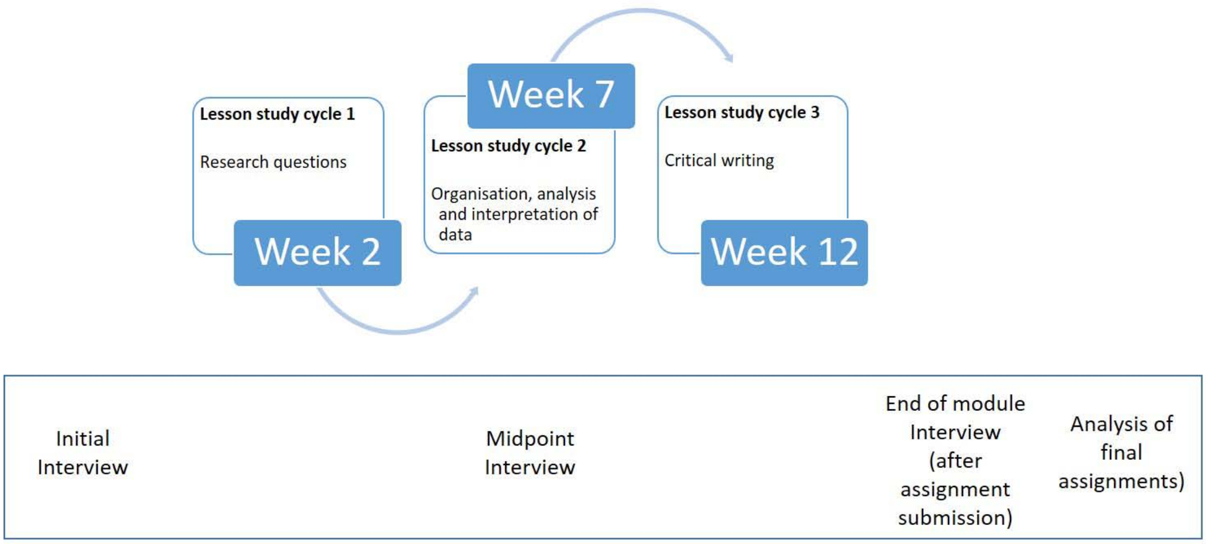

Figure 4. Overall schematic of data collection for emergent evaluation approach

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Initial Results

This pilot study allowed us to gain a number of insights. Here, we focus on the reflections and advantages we gained as curriculum developers, and also consider some of the possible issues and challenges of scaling up the approach to larger groups.

At the beginning of the module, the initial interviews we completed gave us very useful insights into relevant prior learning of students. One student had completed a social research methods course at undergraduate level, and therefore felt that she had a relatively clear foundation on which to build her studies. Another student had come from a non-social sciences discipline, but had been involved professionally in small-scale research projects, so had some practical experiences of research involvement, but little theoretical perspective. This helped us understand the very different starting points from which students enter the module on research methods. The interviews also gave us opportunity to understand in some detail the learning practices students had developed in their first module, prior to research methods. Again, even though we only conducted interviews with three students, all had very different approaches to their studies, often based on prior learning approaches, but also practical, work-based constraints. By using the information from the initial interviews we were able to gain some critical and rich insights into prior learning and students' approaches to their learning. These provided useful starting points for our collaborative planning sessions once the lesson study cycles started.

The first two modified lesson study cycles (see Figure 2) which focused on research questions and data organisation/ analysis/ interpretation, proved to be very positive experiences for the two researchers. The opportunity to discuss and build a week-long work package through discussion allowed us to develop a more critical and in-depth consideration of the content to be covered. During the second cycle, we were also able to use student stimulated recall data from the first cycle to inform our discussions. In the planning meetings we built out from some basic principles to create possible narratives and activities to create a coherent package for students. An example of board notes from the planning meeting for modified lesson study cycle 2 is shown in Figure 5.

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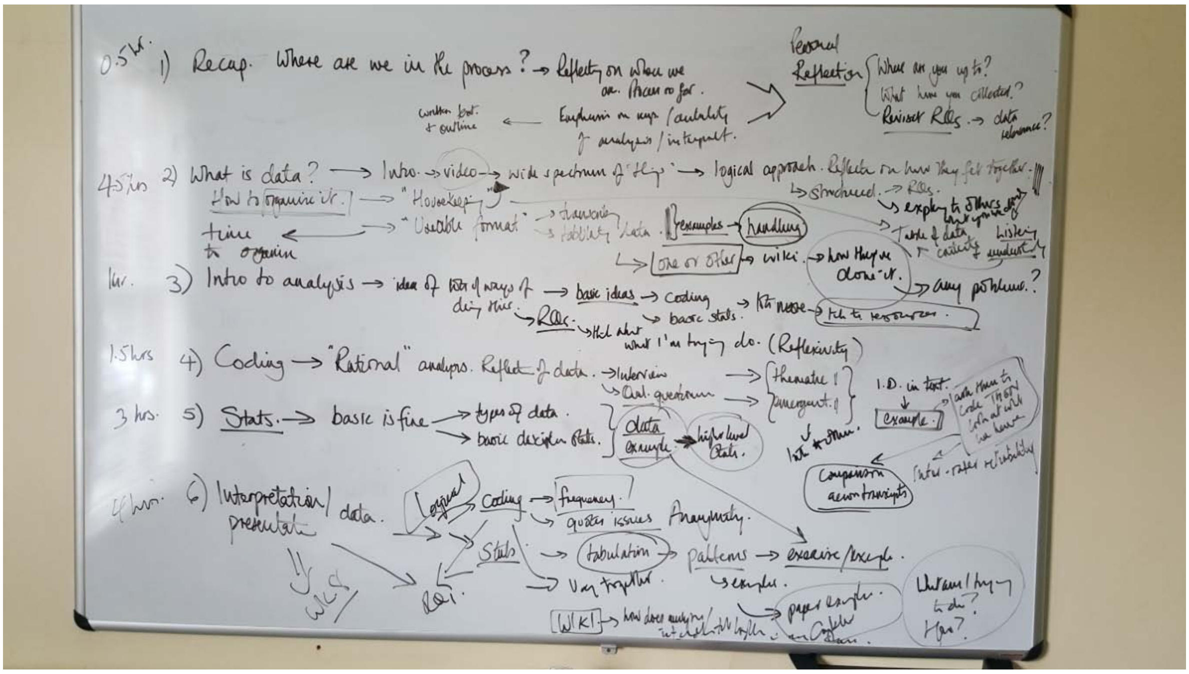

Figure 5. An example of board notes from the planning meeting for lesson study cycle 2

In these meetings we considered how we thought the students would engage with the materials and how this would help them in understanding the issues and concepts covered during that week. These predictions were then considered again when we evaluated the week's work package in the evaluation meeting, having interviewed students to understand their perception of their learning. As such, this approach gave us a lot of insight and further questions concerning the development of curriculum materials. As we evaluated one element of the work, it helped us consider the development of the next element, often in ways we had not envisaged, leading to the notion of an emergent process.

The emergent evaluation approach allowed us to develop elements of the curriculum in real time, driven by student response and reflection, thereby helping us shape the content and approach of the module. This meant that we gained a deeper understanding of the complexities of pedagogies, with the chance to respond to need. In this way the evaluation became both diagnostic and formative rather than summative as often happens in module evaluation.

In the final cycle of modified lesson study we attempted to consider how a participative model (Wood & Cajkler, 2016) would work (see Figure 3). On this occasion, we started by asking the students to explain particular pertinent concepts such as 'critical writing' to gauge their understanding of core concepts for the week-long work package on assignment writing. We then went on to ask them what they believed they would gain from most in the week given the focus on starting their assignments. These reflections were extremely useful in helping us understand what activities would have most potential impact in taking their learning forward, and some of their ideas and reflections were incorporated into our discussions and curriculum development.

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Reflections and Initial Insights

Using a modified approach to lesson study as the basis for emergent evaluation has proved to be a very positive experience. It allows for rolling renewal and development of materials, and moves away from the overly-general summative evaluations which are often too vague to help develop new pedagogic approaches. We believe that an emergent approach can offer useful insights and allow for curriculum development which is both well-grounded in an understanding of student needs, and also which helps programme tutors gain a shared perspective concerning the course they are responsible for. We also believe that lesson study, in a modified form, translates well from a face-to-face setting to one which supports development of distance learning pedagogies.

There were inevitable challenges, the most important being time. The three cycles of lesson study led to intensive work, with interviews leading to planning and package design and development within one working week before student use. This means that time was not only being made to complete the lesson study cycle, but also to complete a work package within a five-day window. This was intensive work, but did rely on a foundation of pre-existing module material, so that package development was in some cases a process of editing and reorienting rather than starting from scratch. Because of the intensive work required to develop a work package, and the multiple cycles used across the module, we envisage an emergent evaluation approach being used in a targeted manner, perhaps across two modules per year. In this way, it could be used as an integral approach to renewing and innovating on distance learning courses. To attempt to use it on a larger number of modules over one academic year would, in our opinion, be unsustainable.

The cohort involved in this pilot was small, with only three students being involved in the interviews, and five overall in the cohort. There is a question mark as to how well this model would scale-up, but we see no reasons why it should not work with larger cohorts.

Finally, there is a wider question mark over the degree to which emergent evaluation would fit within wider, increasingly performative, evaluation frameworks used by universities. We see this approach as being used instead of summative evaluations for the simple reasons that it gives more nuanced, more critical and in-depth insight into the learning and needs of students. However, as such it is working with the complexities of pedagogy and students; the use of summative statistics would be drastically over-reductive in this context, but is often the type of data that university quality assurance systems need.

We see emergent evaluation as focusing on developing the quality and focus of curriculum approaches through diagnostic and formative debate with students and other colleagues. This pilot has demonstrated that a great deal can be gained by working collaboratively through a modified lesson study approach, supported by more general periodic interviewing. The constant, iterative approach allows for immediate incorporation of lessons learned and allows us to gain a much more in-depth understanding of student learning patterns and needs.

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A MOOC WITH A DIFFERENCE: CREATING COMMUNITY FOR LEARNING IN MOOCS

Martha Cleveland-Innes, Daniel Wilton, Nathaniel Ostashewski, Nancy Parker, Athabasca University, Canada

Summary

In keeping with ERW9 theme of *Evolving Practices in Technology Enhanced Learning and Teaching* this paper presentation will offer participants the opportunity to discuss the MOOC initiative and how MOOCs may, or may not, offer increased access to learning, in higher education and beyond. In addition, the review of MOOC courses provides another opportunity to consider online learning and teaching; what is essential, and how those essential pieces may support a pedagogical sound learning experience in MOOCs. This study examines different methods of facilitation in an instructionally designed MOOC for novice online learners called *Learning to Learn Online* (see http://www.ltlo.ca) and the role of both design and interaction for different dimensions of presence in a Community of Inquiry (COI) framework.

Introduction

Athabasca University opened in 1970 to offer open, accessible higher education to students in Canada and beyond. It was Canada's first provider of distance and online university education and is still the largest, serving 40,000+ students annually. Known as innovators and leaders in distance education, the emergence of MOOCs was of both interest and concern at Athabasca University; interest in reference to the opportunities MOOCs could offer as accessible, affordable education and concern at the speed with which MOOCs were being designed and delivered without reference to distance education research or instructional design.

An AU-MOOC Advisory Group was created to consider the opportunity to do just that: evaluate the opportunity to use what is known about successful distance online education in a massive open online course. Learning to Learn Online was the chosen topic for this exploratory MOOC design research. Learning to Learn Online (LTLO) is a facilitated massive open online course (MOOC) offered by Athabasca University via Canvas' MOOC platform. It is designed to provide novice online learners with effective skills, practices, and attitudes for online learning. This five-week MOOC was offered in the spring of 2015 and again in the spring of 2016.

The creation of LTLO rested on sound instructional design strategies (Sheninger, 2016) and the premises found in the online community of inquiry as identified by Garrison, Anderson, & Archer (1999). For Sheninger, "instructional design (ID) is part creative arts and part science which utilizes theoretical as well as practical research in the areas of cognition, educational psychology, information technology, graphic and Web design, and problem solving. ID aims to create the best instructional environment and learning materials to bring a learner from the state of not knowing, not feeling or not being able to accomplish certain tasks to the state of knowing, feeling and being able to accomplish those tasks in a given subject area through carefully organized interactions with information, activities and assessments" (Sheninger, 2016; p.18). These carefully organized interactions were guided by the requirements of social, cognitive, and teaching presence as identified in the community of inquiry framework (Garrison et al., 1999); it is at the convergence of these three mutually reinforcing elements that a deeply personal, collaborative constructivist educational experience may be realized.

Background

Usually referred to as online learning, web-based teaching and learning describes a learning environment which is electronically supported: virtual classrooms, Internet-based learning management systems with multi-media digital materials and meetings spaces. These spaces are self-paced, self-directed learning opportunities and, in the case of formal, accredited education programs, led by an instructor. Online learning surfaced in the 1960s as an education delivery method through the evolution of distance education – a unique form of education delivery with specific roles for teachers and learners. These roles in distance education are unique to the delivery method and significantly different than the roles of students and teachers in face-to-face, traditional higher education. According to Allen and Seaman in the US, online learning is on a consistent increasing trajectory, and all expectations are that participation will continue to grow. Athabasca University in Canada has been providing accessible, open, distance and online learning since the 1970s.

The most recent form of open, distance, online teaching and learning delivery has caused a significant stir –Massive Open Online Courses, or MOOCs. A unique form of distant and open education, MOOCs provide informal learning opportunities and access to knowledge and knowledgeable people previously out of reach for many. Some suggest that the advent of the MOOC initiative is the most significant event in higher education to occur in decades. Considered from the point of view of access to education, MOOCs are a moderate increase to access available to someone willing to study online, but may compromise education quality out of balance to the benefit to access afforded by a MOOC.

The massive open online course is still under-investigated, with institutional investment and media attention preceding a more rigorous, peer-reviewed evaluation of its effectiveness as a learning medium. Gasevic et al. (2014) point out this lack of methodological or theoretical rigour in early MOOC reports, suggesting a difficulty in applying existing social learning frameworks at the scale of a MOOC. However, the notion that productive learning

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environments, as are required in higher education, can be constructed without facilitator leadership is deemed to be erroneous (Cleveland-Innes, Briton, Gismondi, & Ives, 2015).

In order to address this issue, this study tested the role of facilitator in a MOOC environment and identified unique patterns of participant interaction when facilitator roles moved from direct and on-demand to supportive and facilitative.

Methods

Learning to Learn Online was designed by a team of educators: researchers in online learning, professors with experience teaching online, instructional designers, and a web-analyst. Design imperatives were identified from the online learning conceptual framework called the online community of inquiry by Garrison, Anderson, and Archer (1999) and the preliminary MOOC instructional design research by Athabasca University researchers Cleveland-Innes, Briton, Gismondi, and Ives (2015).

Because research strongly suggests that *instructor presence* is essential to the success of online learning (Garrison, Anderson, & Archer, 1999; Garrison & Cleveland-Innes, 2005; Akyol & Garrison, 2014), we designed LTLO with three levels of instructor presence. These three levels represent, individually and in combination, the three requirements of online teaching presence: design and organization, direct instruction, and facilitation. These are manifested in the roles of a lead course Instructor, one Inspirer who supported and summarized learning activities, and discourse Facilitators. The course is "led" by a professor who offers direct instruction, who will act as the figurehead of the MOOC in the role of the primary *Instructor*. The instructor provides a consistent "flat" presence through the use of pre-recorded video / pre-set text segments.

The second layer of instructor presence (the *Inspirer*) uses a combination of guiding participants through the design and organization of the course, reviewing direct instructions, and facilitating participant experience as necessary. The Inspirer is an Instructional Designer. The third level of instructor presence, the Facilitators, are a dynamic presence, responding to learner emails, discussion board posts, submissions and activities, etc. These facilitators are AU Masters students.

Following the Community of Inquiry framework (Garrison, Anderson, & Archer, 1999), one of the key elements of LTLO's design was to create smaller, more focused learner support networks within the MOOC by dividing the students into a number of homeroom forums for facilitated, general discussions. Students were divided into homerooms alphabetically by first name, with no attempt to group by characteristics, abilities, or interests. As part of their learning, students were also prompted to contribute to additional population-wide, lesson-related activity forums throughout the course, with all facilitators participating in each activity forum.

In the first offering, ten such homeroom forums were created, each with its own facilitator, along with separate forums for each activity, for a total of 39 forums. The facilitators received

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basic training in facilitation techniques and were directed to provide a high level of support with quick and frequent responses to student questions and postings.

In the second offering, the number of facilitators was reduced from ten to four, with just two homeroom forums, each with a pair of facilitators, along with five module-based activity forums, for a total of seven forums. In this run, the four facilitators (selected from the original ten) were asked to be more selective in their responses, to give students the first opportunity to respond to each other, and to encourage more student-to-student dialogue and support, with the goal of shifting the focus and weight of the discussions from the facilitators to the students.

Participation activity cross-referenced with demographics in the two sessions is reported and compared below.

Findings

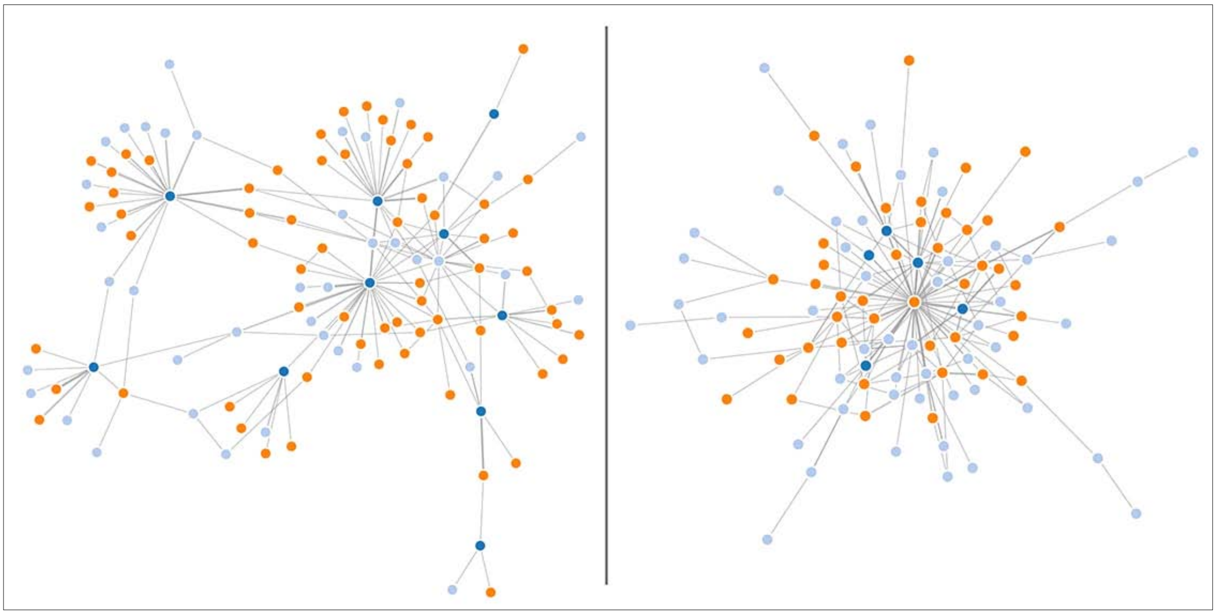

Figure 1. Social network graphs for Module 1 activity (left: 2015, right: 2016).
Dark blue nodes represent facilitators, orange nodes represent students who completed the course, and light blue nodes represent non-completing students. (Social network graphs for additional modules and homerooms for both offerings are available at http://www.ltlo.ca/analysis.)

In the first offering, 842 person-to-person links (edges), defined as a direct reply within a threaded discussion, were formed between participants. 333, or 40% of the links, were between two students, with an average strength of 1.53 contacts per pair. The social network graph compiled from the three Module 1 forums (Figure 1, left) shows a collection of star-shaped clusters centred around instructors (dark blue nodes), but with fewer edges between students (orange and light blue nodes). 50% of the inter-student links were formed after 12 days, and 90% were formed after 31 days of the five-week MOOC. Using logarithmic regression, at no point in the course did the number of re-contacts between the same pairs of students overtake the number of initial contacts (Figure 2, left), suggesting very little sustained interaction.

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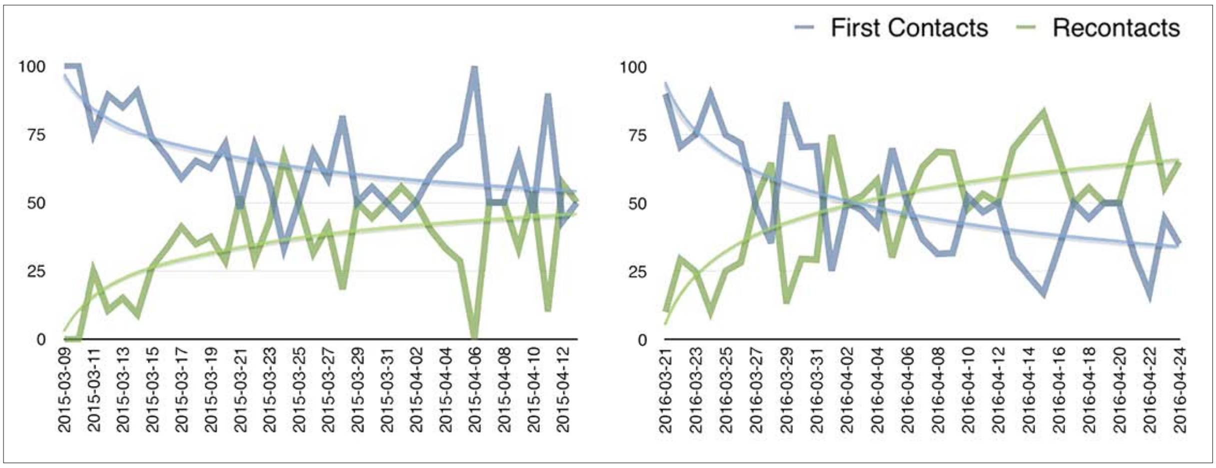

Figure 2. Initial contacts between students (blue) vs. re-contacts (green) by course date (left: 2015, right: 2016)

In the second offering, 535 links were formed between participants. A much higher number of links – 428, or 80% of the links – were formed between pairs of students, with an average strength of 1.7 contacts per pair. The social network graph for the Module 1 forum (Figure 1, right) shows more tightly-connected pattern distributed more evenly between students and instructors. These links were formed noticeably earlier in the five-week MOOC, with 50% of the links formed after just seven days and 90% formed after 25 days. Using logarithmic regression, re-contacts between the same pairs of students overtook initial contacts after 14 days (Figure 2, right), suggesting that students formed their relationships earlier and were able to build upon them before the course completed.

Table 1: Mean distances between pairs of students by characteristic. Lower numbers indicate greater similarity

Attribute	Year	Mean distance between all students	Between students making first contact	Between students making second contact	Between all contacting students
Age (years)	2015	13.6	13.5	15	13.7
	2016	14.8	13.3	15.1	14.8
Gender (binary)	2015	0.44	0.32	0.41	0.33
	2016	0.46	0.5	0.56	0.52
Education level (ordinal)	2015	1.97	2.11	2.24	2.11
	2016	2.11	1.87	1.8	1.92
Skills (ordinal)	2015	0.54	0.49	0.28	0.36
	2016	0.57	0.67	0.61	0.62

As shown in Table 1, the students in the first offering tended to initiate contacts with those of the same gender (a mean distance of 0.44 between all students but 0.32 between those contacting each other for the first time), but then developed an increasing bias towards those of a similar skill level (a mean distance of 0.54 between all students but 0.28 by the second contact).

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In the second offering, students were less likely to form contacts with fellow students of the same gender, or even of the same skill level, with education level being a better predictor of contact between students (a mean distance of 2.11 between all students but 1.8 by the second contact).

Discussion

One of the questions in the ID of MOOCs is the appropriate role of discussions and facilitators in a short-term course of this scale and nature. In this comparison between two offerings of the same MOOC, with similar student profiles but notably different discussion structures and facilitation patterns, we can begin to extract some of the effect of those structures and patterns on student-to-student interaction and the formation of a Community of Inquiry.

By reducing the number of groups and adopting a facilitation model in which students are asked to take on a greater role in supporting their peers, the balance of interaction has shifted dramatically towards the students, and in the process, has increased their betweenness, a proxy for social capital within the network.

Rather than the first offering's star formations, with the facilitator at the centre, a greater range of linkages formed in the second offering, and with it, a tendency to form contacts earlier and a greater likelihood of re-contacts and stronger linkages. Rather than the more obvious linkages between students of similar gender or the more pragmatic linkages of similar skill level in the first offering, students in the second offering appear to be gravitating more towards those with similar education levels for further contacts, suggesting a richer form of mutual support.

Conclusions

Is it possible to maintain the access and affordability offered by MOOCs while completing the education iron triangle (Daniel, Kanwar, & Uvalić-Trumbić, 2009) which requires pedagogical quality as well?

It is unrealistic to expect the MOOC initiative to contribute to higher education without careful reference to existing instructional design requirements in regular online design and delivery. Much of the accolades provided for MOOCs are general attributes of online learning. Like any online education, MOOCs can (a) increase access, (b) foster equity in the learning environment as it is colour and gender blind and class neutral, (c) create affordable, convenient learning opportunities, and (d) develop expanded learning skills for students related to self-direction, self-regulation and collaboration. Online opportunities can provide quality education to an increasing audience previously left-out of elitist, geographically-bound and expensive place-based higher education. However, MOOCs take this a step further, allowing free access to any interested party who signs in and partakes of the experience, yet it is not yet clear if these new versions of online learning carry all the requirements of a sound, measured learning experience with appropriate and necessary outcomes. MOOCs design

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should borrow from small-scale online design and delivery, rather than face-to-face models, but will also need to move beyond it.

Further opportunities for research include a deeper investigation of the linkages formed between pairs of students and, by extension, network clustering to explore the spontaneous development of discussion sub-groups and support networks by the students themselves. This is a growing area of data analytic documentation may provide information that correlates socio-academic activity

A third offering of LTLO runs in March, 2017. See http://www.ltlo.ca for more information.

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USE OF MOOCS IN TRADITIONAL CLASSROOM: BLENDED LEARNING APPROACH

Antonia Bralić, Blaženka Divjak,
Faculty of Organization and Informatics, University of Zagreb, Croatia

Summary

MOOCs were initially designed as stand-alone products but blended learning programs have been developed to utilize the benefits of MOOCs. This paper presents case study research of incorporating a MOOC into traditionally delivered course with specific goals of giving students opportunity to experience learning in virtual environment and helping part-time students in achieving particular learning outcomes. Benefits and obstacles of such an effort were researched in a case study where part of the traditionally delivered learning was replaced with a MOOC at a compulsory graduate level course. Students were asked to choose between completing a MOOC and taking project-based activity to work towards the final grade. While going through the MOOC, it was required from students to keep a *learning diary* to showcase the understanding of the content but also to provide insight for qualitative analysis based on a set of questions that the students were required to answer. The case study research was based on qualitative analysis of the learning diaries and on quantitative review of achieved results. Qualitative analysis of the answers to open ended questions showed that students' overall feedback has been positive. Students were generally satisfied with this form of learning, despite some difficulties, such as language barrier or sufficient prior knowledge or required workload. Most appreciated characteristics of MOOCs were self-paced learning and the option to assess knowledge on regular basis, especially among part-time students.

Introduction

Growing popularity of Massive Open Online Courses (MOOCs) is indisputable. Morris (2014) for example states that "MOOCs are available to students to supplement their learning and personalized learning environments, and use of learning analytics are set to transform education". Until today, different options of integrating MOOCs in formal education have been explored, implemented, and evaluated. Two main types of embedding MOOCs in traditional taught classes to achieve learning outcomes have been noted: (a) recognizing results achieved in MOOCs before enrolling in a learning program (prior learning) and (b) supplementing or replacing segments of academic courses with content from MOOCs. Variety and availability of MOOCs have been a strong encouragement for both cases. This paper focuses on the latter. Goal is to enhance learning processes and ultimately, increase retention of acquired knowledge and engage learners. This method of teaching has advantages and challenges, as discovered in previous research. A right blend should take best of offline and online learning to create a system that enable students to achieve learning goals in the best possible way.

Many blended learning programs in academic setting today are created around traditional courses that are now enriched with online content and capabilities. Blended learning program can be built with any online content, not necessarily MOOC content. There are multiple benefits of incorporating MOOCs in traditionally taught courses. Griffiths, Mulhern, Spies, and Chingos (2015) study generated six of them: "replaying lectures, augmenting or replacing secondary materials, filling gaps in expertise, exposing students to other styles of teaching and class discussion, reinforcing key skills, and teaching students how to teach online". Series of authors claim that blended learning approach can enhance teaching and learning, for example (Morris, 2014; Gilbert & Flores-Zambada, 2011). Several attributes characteristic for blended learning agenda at some institutions were detected by (Sharpe, Benfield, Roberts, & Francis, 2006): "flexibility of provision, supporting diversity, enhancing the campus experience, operating in a global context and efficiency", which can also be translated to benefits of programs like this. Often mentioned downside of MOOCs is low completion rate. Koller, Ng, Do, and Chen (2013) coin the term *retention funnel* and state that high dropout rates in MOOCs can be alarming for traditional educators. Embedding MOOCs in traditional face to face (f2f) classes by assigning credit to its partial or full completion could partly solve drop out problem. One student that participated in the covered case study in this paper stated that she "used MOOCs earlier to supplement the classroom learning but due to university related commitments she was not able to complete MOOCs. That is why incorporating a MOOC in classroom taught courses so its completion counts towards the final grade is a great motivator". Computer literacy and technology acceptance are general challenges of online learning that need to be kept in mind. Israel (2015) emphasizes that integrating a course that is not designed to be a part of a blended learning program, holds its challenges, such as ensuring student engagement. Having benefits and challenges of MOOCs in mind, it has become clear that a proper blend of online and classroom activities has to be created to achieve success among a targeted student audience.

Series of studies and experiments have been conducted to trial and evaluate the use of MOOCs in traditional taught courses. Griffiths et al. (2015) have conducted a study to "examine the use of MOOCs in fourteen campus-based courses". No statistical difference in pass rate or final score was registered in those studies, but feedback covering rating, interest, amount learned, and difficulty was better for traditional taught classes. Further on, blended learning with MOOC content was piloted at San José State University (SJSU), leveraging an edX course in class. Flipped classroom model including projects and quizzes was implemented. This program achieved "a high success rate with 90% of the students passing the final exam, as compared with 55% in the traditional class of the previous year" (Ghadiri, Qayoumi, Junn, Hsu, & Sujitparapitaya, 2013) in (Yousef, Chatti, Schroeder, & Wosnitza, 2015). Israel (2015) reviewed models of blending MOOCs in traditional classroom teaching; major findings were that "there is modest positive impact on learning outcomes, no

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significant evidence of negative effects for any subgroups of students, and lower levels of student satisfaction are recognized in blended MOOCs in classrooms. A blended learning program has also been experimented at Vanderbilt university as well where Coursera *Machine learning* MOOC was incorporated in a graduate level course on machine learning. MOOC chapters were built in the course, accompanied with additional learning and tasks that were important for the students. Students' experience was evaluated through a focus group and qualitative analysis. The student feedback was overall positive; students appreciated flexibility, possibility to learn *at their own pace*, and bite sized videos, but also realized that it takes motivation and self-discipline to stay on track. Students did not participate in forums and discussions but described forums as useful to realize the issues other students might have. Students appreciated the flipped classroom model and the possibility to apply what has been learned outside of class. Students were asked to give a rating of the course and the blended approach in 2012 had higher satisfaction score than the traditional taught course in 2006, on these small samples, which needs to be taken into consideration (4.17 and 3.83 respectively) (Bruff, Fisher, McEwen, & Smith, 2013). This model is similar to the one applied at University of Zagreb, Faculty of Organization and Informatics in Croatia (FOI) that is presented in this paper.

Case study and research questions

The course Discrete Mathematics with Graph Theory (DMGT) is taught in the first year of master level of study programs Information Systems and Software Engineering at FOI. It is taught as a blended learning course and both full-time and part-time students are enrolled in the course. The syllabus consists of two parts: in the first part different topics in discrete mathematics are covered and the second half is dedicated to the graph theory and its applications. The topics have sound foundations in mathematical theory but offer multitude of applications of the covered theory in computer science and business, e.g. problem solving exercises that are performed individually or in teams (Divjak, 2015). Incorporation of a MOOC in the course is learning outcomes-based. The constructive alignment for the two learning outcomes (out of 7) for the course DMGT is presented in Table 1. Term "constructive alignment" is coined by John Biggs (2003). In order to guarantee achievement of intended learning outcomes they must be aligned with teaching and learning method, assessment and student workload.

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Table 1: Constructive alignment of two of the learning outcomes on the course DMGT

Course learning outcomes related to MOOCs	Teaching and learning method	Assessment method	Student workload – ECTS credits
LO1: Solve real world problems in ICT with methods from graph theory and discrete maths individually and in collaboration (fully covered here) LO2: Use mathematical literature from multiple sources, at least one tool for processing mathematical language, and an e-learning system, having specific characteristic of mathematics in mind (partially covered here)	Students work in teams of three on posing and solving authentic problems Alternative: students participate in selected MOOCs	Teacher assessment and peer assessment of problem solving based on prepared criteria and scoring rubrics Alternative: assessment of MOOC performance (90% of a final grade); diary analysis and presentation of MOOC to other students (10%)	LO1: 40 hours = 1.5 ECTS (approx. 20% of the course 7 ECTS) LO2: 20 h

MOOC has been offered as an alternative activity to project work that was credited towards the final grade in the course. Both activities are aligned to the same learning outcomes as it is shown in Table 1. There is a two-folded goal for the introduction of MOOC in the course. Firstly, to give students more online learning experience and secondly to help part-time students, that are working and are not able to fully participate in campus teaching, in meeting the course's learning outcomes. We researched the case study in order to answer the following research question:

1. Can use of MOOCs help in giving students positive learning experience in virtual environment and help part-time students in achieving particular learning outcomes?
2. How to align course learning outcomes and student workload with use of MOOCs in a specific course?
3. What are the main challenges for students in using MOOCs?

MOOC learning program is covered and evaluated in this paper for academic years 2014/2015 and 2015/2016. In the first academic year, students were asked to choose a course-related MOOC on Coursera platform and a teacher needed to approve a choice. In the second academic year students were supposed to choose a course among those that were preselected and offered in LMS (Moodle), to provide a more focused approach and increase quality of the program.

Case study analysis: quantitative and qualitative

The sample in this research was made out of graduate students enrolled in DMGT course. In the academic year 2014/2015, there were 107 students enrolled in DMGT class, 28 female and 79 male students, out of which 9 chose to complete a MOOC. In year 2015/2016, 88 students were enrolled, 75 male and 13 female, out of which 22 chose a MOOC. In both years, part-time and full-time students were enrolled in the course but part-time students were particularly encouraged to take a MOOC. Some trends are shown in Table 2.

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Table 2: Metrics, 2014/2015 and 2015/2016

Name of metric	2014/2015	2015/2016
Percentage of students that chose MOOC over project work	8.26%	25%
Average final grade of students who completed a MOOC	37.94%	52.93%
Average final grade of students who completed project work	45.53%	50.48%
Average evaluation of MOOC related tasks (by teacher)	85%	71.67%

Number of users that chose MOOC over project work grew significantly in 2015/2016. This could be related to previous experiences shared by students that attended DMGT course. In year 2014/2015 better average final grade was achieved by students who completed project work but the results changed in 2015/2016 when a better final grade was achieved by those students who chose MOOC over project work. This change can be explained in different ways but since there was too small proportion of all students taking MOOCs to make any reliable conclusion based on quantitative data. Data taken from the second year is more reliable because every fourth student took a MOOC. Based on that, it seems that the achievement of learning outcomes is on very similar level for both groups. Finally, MOOC related tasks have been graded better in 2014/2015. This grade consists of two parts: 90% are based on MOOC's final grade received by students and 10% on their diary quality and short presentation of MOOC to other students. Further research needs to be done in the upcoming years of teaching this course with the same approach, to be able to detect trends and more reliable results because the main limitation of the quantitative part of this research is a small number of students in MOOCs.

Students were obliged to keep a learning diary when going through the MOOC. Diary was roughly determined by required open-ended questions. *Journal* feature in Moodle was used to keep learning diaries by students and to deliver feedback by teachers. Questions that were set in front of the students to describe their experience with MOOC were essentially the same in both academic years as it can be seen in table 3. In 2015/2016 the questions were fine tuned to gather more detailed information and the volume of required handed review was increased from 400-800 words to 800-1000 words. Open ended questions offer guidance and ensure loose uniformity in results. Still, this way of feedback gathering allows enough flexibility to express personal experience and opinion. The answers relevant to the research questions are analyzed in the following paragraphs.

Table 3: Questions asked in MOOC learning diary

1. Which MOOC did you choose and what success did you achieve? Certificate/points upload
2. What did you learn? Please refer to learning outcomes of the course DMGT.
3. Elaborate your weekly activities in MOOC by explaining what you learned. Have you encountered this content earlier in your studies at FOI?
4. How are content and methods covered in MOOC related to DMGT course?
5. Elaborate your weekly activities in MOOC by explaining what you learned. Have you encountered this content earlier in your studies at FOI? (only in 2015/2016)
6. How would you describe your experience with using MOOCs?
7. Estimate the time required to successfully complete the MOOC (personal opinion, not what is listed on MOOC site)
8. What changes could we introduce to DGMT course based on your experience with the MOOC you took?

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Connection between MOOC and DMTG course (questions 1-5)

As required, all students have uploaded a screenshot of their certificates of completion and shared the results they achieved. Similarly, a description of weekly activities was done, in more or less detail, by all students. Most variety was encountered in questions covering connections between MOOCs and DMGT as well as courses taken throughout formal education. Students that took different MOOCs were able to connect them with particular learning outcomes of DMGT not necessarily the ones from Table 1: (a) "I would link the Coursera course to a specific learning outcome of DMGT: to use mathematical literature from multiple sources, at least one tool for processing mathematical language, and an e-learning system, having specific characteristic of mathematics in mind."; (b) "I would connect MOOC learning outcomes with three DMGT learning outcomes". Some students have found loose connection between MOOC content and classroom taught content. Several have emphasized that MOOC in fact covers practical implications of what is taught in the classroom taught course and how well they supplement: "DMGT and MOOC are complementing each other very well. In DMGT I received theoretical grounds and MOOC helped be to understand the theory following practical examples". One of the most mentioned elements of this type of learning was the language of MOOCs. Learning in English was rather new for most students and the feedback was various: (a) "I was sceptical because of the language barrier (…) and taking a MOOC was quite a challenge because it required combining English language and important content"; (b) "I liked this way of learning because, in addition to learning itself, I had a chance to practice my English skills and to think about this topic in English". Not all language related feedback was positive: (a) "As the MOOC was progressing, it took more time and effort to complete everything in the curriculum. Completion was additionally slowed down by English language"; (b) "I spent most of the time translating tasks to Croatian to understand what needs to be done".

Experience with using MOOCs (question 6)

Generally speaking, the experience of taking a MOOC has been positive, with majority of students reporting that they would encourage continuing this way of teaching DMGT and that they will continue to use MOOCs to supplement their own learning: (a) "As I was going through the course I selected, I have also browsed through the platform and detected several other courses I plan to take at a certain point"; (b) "The entire experience (…) is very positive. This is the first time I have studied something this way, but it is definitely not the last one". In the first year, choosing a MOOC that fitted DMGT was students' responsibility and the reactions were various. Some have appreciated this approach: "A significant advantage was that we (students) were not limited by a certain topic, but only by an area that needs to be covered in a MOOC", while some would have preferred to have a specific MOOC to take: "It would be good to have a specific course as a task, rather than being given the option to choose any course that fits DMGT. Coursera library is very extensive so it took some time to find the appropriate course". Based on this type of feedback, practice changed in the second year and a list of potential MOOCs was shared in LMS. Self-paced learning was much appreciated; students valued the option to learn when possible and when it suits them. It also helped to

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have a structure in place to keep them on track: (a) "I was able to plan my time dedicated to learning. The only element to have in mind was the quizzes deadline, where I had three attempts without time limit, which was more than fair"; (b) "Being time-flexible was one of the most important elements of MOOCs"; (c) "Advantage of MOOCs is the possibility to access content anytime, when I was focused and motivated, and interested in that content. Thanks to this, I was able to master the content in a more efficient way – simple and fast". Students also have had positive experience with more frequent knowledge evaluation: "More frequent knowledge evaluation is far more effective than having two exams per semester".

Time required to successfully complete the MOOC (question 7)

To fit MOOC in a classroom taught course properly, it is important to value the time spent to complete the MOOC. This aligns with ECTS points awarded for each traditionally taught course in formal education. As mentioned in Table 1, goal was to cover MOOCs with estimated 40-50 hours to completion, to fit approximately 30% of complete DMGT course ECTS load. The actual time spent on completing a MOOC occasionally differs from what is stated on MOOC providers' websites. Still, most students have shared that the time it took them to complete the MOOC corresponds to what is stated on MOOC homepage. However, common feedback was that the required time can prolong significantly depending on prior knowledge of the subject and consequently speed of completing follow up tasks, as well as on efforts put into studying follow up literature: (a) "In the beginning I was fast with solving problems (…) because I have encountered this content before (1h-2h/week). Later, it took me longer to solve tasks and I needed to go through materials again (4h-5h/week)"; (b) "It took the same amount of hours as stated on Coursera site to complete the MOOC, but to rewind the videos and to fully understand the content, it took twice as much time as suggested"; The role of English as the language of all chosen MOOCs was also significant in actual time required to complete the MOOC: (a) "Some tasks were easy while some required significant effort to master mathematical cryptography terminology in English"; (b) "If a student understands English well, it is possible to follow lectures at a higher playback speed". Challenging tasks are not merely a time consuming activity; some students report that challenging tasks make MOOC participation more interesting: "Tasks that trigger intensive thinking are the reason why I'm glad I chose MOOC", but also: "It would be hard to follow MOOC content without basic subject knowledge gained in classroom.". Interesting feedback in regards to time spent on MOOC was given by a student who stated that "5 hours per week is the optimal amount of time to dedicate to this type of learning, as it's likely that individuals spend the same amount of time on activities that are not at all connected to university related tasks".

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Discussion and conclusion

After analyzing learning diaries and overall student performance on the course let us summarize answers to research questions. Since the small sample is serious limitation of the quantitative part of research conclusions are mostly based on qualitative analysis of students diaries.

Can use of MOOCs help in giving students positive learning experience in virtual environment and help part-time students in achieving particular learning outcomes?

According to feedback gathered in the learning diaries, MOOCs have supported learning in virtual environments, providing an experience that was new for majority of students that participated and opening doors to online learning for students. To them, possibility to learn at their own pace was very important. Recognition of the value of forums, discussions, and partnering with other to achieve best results justifies that the MOOC activity is an alternative to the team work that also has a goal to enhance collaboration skills of students. Furthermore, feedback showed that part time students are happy about the opportunity to have an option to manage their learning. This option was mentioned as an improvement opportunity for traditionally taught classes as well. Common student feedback was that this exercise resulted in exploring MOOC platforms and what they have to offer. Authors, after carefully examining answers, strongly believe that students will continue to use MOOC platforms to supplement the classroom teaching, or to expand their knowledge in general. Knowledge assessments have also been accepted well by students; general belief is that regular knowledge assessment increases knowledge retention and reduces stress related to adopting big amount of content.

How to align course learning outcomes and student workload with use of MOOCs in a specific course?

In order to introduce MOOCs into traditional classroom fine tuning with learning outcomes, assessment methods and students workload is required. Special attention should be given to student's workload having in mind students prior knowledge and possible language barriers. Therefore, a teacher should check all recommended MOOCs very carefully in advance and estimate student workload. Actual students' workload for non-native English speaker students is usually higher than listed on an official MOOC declaration. Interestingly, intended learning outcomes (Table 1) were not always recognized by students as covered by MOOC exercise. The possible explanation is that students are not very interested in the pedagogical foundation of the course and the concept of learning outcomes. Students much more easily map concrete content than abstract competences such as problem solving.

What are the main challenges for students in using MOOCs?

Language has been pointed as a barrier for multiple students. Obviously, good command of English language can significantly contribute to the MOOC completion. Still, even though English language was emphasized as a barrier, it was also characterized as a positive challenge an all students successfully finished courses despite of the potential language barrier. Further,

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students emphasized importance of previous knowledge (mathematics and programming) that enable them to be successful in MOOC despite of the declaration at the beginning of majority of MOOC that no specific prior knowledge has been required. Finally, students appreciate applications and implementations of knowledge as well as more frequent knowledge and skills assessment. Students are also aware that self-motivation and completing tasks in time is required to successfully complete the MOOC, which requires thorough planning of MOOC related activities so they fit in students' schedule.

To conclude, blending MOOCs in DMGT course resulted in multiple findings and opened further research questions. Even though the model described in this paper is similar to certain models and researches in blended learning, this model is based on learning outcome approach and have student workload and prior knowledge in mind. Furthermore, part-time students perceived offering MOOCs flexibility as an alternative to project team work very positively. Comparing research results to similar research, it was found that it is similar in some segments but differs in others. For example, similar as in research by (Israel, 2015), there was no evidence of negative effects for learners that completed MOOCs. There is not a significant difference in final grade among students who joined project work and those who completed a MOOC. However, unlike in research by (Israel, 2015), all students that took MOOC reported high level of satisfaction. This research is a starting point for further research in blending MOOCs in traditionally taught courses, to detect trends, progress, and generate guidelines for a successful implementation of online content from strategic point of view.

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HEAD START ONLINE: A MOOC FOR THOSE THINKING ABOUT, OR PREPARING FOR, FLEXIBLE STUDY

James Brunton, Open Education Unit, National Institute for Digital Learning, Dublin City University, Mark Brown, Eamon Costello, Orna Farrell, Conor Mahon, Dublin City University, Ireland

Summary

Head Start Online is a five week, free, online course (MOOC) that is designed to support prospective and/or new flexible learners' transitions into higher education. Enhancing retention and completion rates of this group of learners, in order to facilitate successful widening of access, is a significant global challenge. Head Start Online is focused on the initial stages of the study-lifecycle, as the foundations for student success are laid early. Head Start Online has emerged out of the Student Success Toolbox project, a nationally funded research and technology development project that developed a toolbox of eight digital readiness/preparation tools that were shared with the sector as OERs, along with a guide for their customisation and use. Head Start Online brings together a number of these tools together in a cohesive pre-induction socialization course that aids new/prospective learners in, for example: calculating how much time they have available in their lives to study, relative to how much time they spend in the other existing parts of their lives; examining what supports they have in their lives, and how those supports may help them overcome common problems experienced by flexible learners; learning about the computer skills needed in higher education; and also about the study skills required to study successfully in higher education. A pilot of the MOOC went live on the week beginning Monday 15th August 2016 and enrolled its first cohort of prospective learners who are currently progressing through the course.

Introduction

Head Start Online was developed as part of the Student Success Toolbox (SST – http://studentsuccess.ie/toolbox/tool4/#/technology-you-will-need/) project, funded by the (Irish) National Forum for the Enhancement of Teaching and Learning in Higher Education (http://www.teachingandlearning.ie) Building Digital Capacity fund. The SST project produced a suite of digital readiness tools for the higher education sector. Head Start Online harnessed a number of these tools to create a cohesive resource for new/prospective learners. The MOOC is designed to assist flexible learners in the early stages of the study lifecycle by tackling the prominent issues of effective transitions and the foundations for student success. Although flexible learning is somewhat difficult to define; we refer to definition proposed by the Irish Department of Education and Science (2000) "mature adult participation [in higher education] through flexible options which can be combined with family and work responsibilities" (Flannery & McGarr, 2014; p.424). Head Start Online utilised an inclusive definition of a flexible learner, portraying such a learner as an adult engaged in part-time or online/distance learning.

The creation of Head Start Online was vital as flexible learners have significantly lower completion rates than their on-campus counterparts; this emphasises the need to enhance the retention rates of this vulnerable student population. This represents overriding issues both on national and international levels. Ireland's undergraduate students are comprised of 17% flexible learners, which is lower than the majority of other countries (HEA, 2012), and there is increasing concern about this significant subset of students' ability to complete higher education remains.

Head Start Online holds the primary aim of providing a supportive resource for flexible learners during the key transitions in the earliest stages of the study lifecycle. These initial stages are represented by thinking about study, making choices, registration and the first few weeks of the course. This MOOC fills a void as the stages prior to flexible learners formally beginning their undergraduate studies have been largely ignored both within institutions and in empirical research. The specially designed digital readiness tools along with the additional specific content (e.g., videos, text) within the MOOC are readily available and provide these flexible learners with much needed support at a crucial stage.

Method

As part of the Student Success Toolbox project Head Start Online was developed using a design based methodological approach. Such a process is iterative in its nature; it does not only evaluate an innovative intervention, but also systematically enhances the innovation while also producing guiding design principles for subsequent associated research and development endeavours (Wang & Hannafin, 2005). Vitally, especially in the context of this MOOC, design-based research strives toward establishing a link between educational research and real-world environments. Firstly, a comprehensive analysis of existing empirical work was conducted in order to establish *what tools work?* relevant to offering support to flexible learner success during the initial stages of the study lifecycle. The aforementioned principal question could only be appropriately answered after addressing the related sub-questions: (a) Who are flexible learners? (b) What do we know about learner success? (c) How does what we know about supporting transitions relate to the above? Once answers were obtained for these queries the approach then scrutinised; (d) What connection exists between the literature and what institutions are providing to flexible learners? (e) What tools could usefully be developed in this project? (Brunton et al., 2016).

Numerous tools emerged from the literature analysis. In a comparison study, Nichols (2011) discussed the utility of support measures, for example compulsory support survey, orientation course, general messages of support, and personal contact with students. Also established as effective tools for encouraging student satisfaction, and increasing their likelihood to

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successfully progress, were discussion forum platforms, active emails, and time-limited lecture postings (Gallie, 2005). Murphy, Politis, and Slowery (2015) emphasised the importance of assisting mature learners in those early stages by highlighting the benefits of offering the relevant information to help course choice, early access to timetables, and activity based learning to improve academic ability. Additionally the researchers reiterated the benefit of providing entrants with a digital environment on which new learners can interact with each other and existing adult learners. Undoubtedly the analysis revealed some interesting insights; however the amount of relevant tools identified was restricted.

Accordingly, a database of existing readiness tools was developed in order to support the literature analysis. Preparing such a database involved analysing 22 websites of worldwide universities to identify the readiness tools they offer to prospective learners or those thinking about study. The next step involved the thematic coding of these tools according to their main function; the following themes emerged: (a) Course match; (b) Preparation for higher education; (c) Orientation; (d) Addressing personal circumstances; (e) Community; and (f) Satisfactory student experience. Conspicuously, the above themes agree with Jones' (2008) principle factors that, when there is an evident shortage, lead to student dropout, thus preventing progression. Associated empirical work was then paired with these thematic clusters, allowing for the clarification of points of convergence between the relevant research and the tools in use internationally.

The aforementioned process lead to the creation of the relevant digital readiness tools, and established the foundations from which Head Start Online was developed. However, when it came time to build up from those foundations we were on less firm ground with regard to having a specific, identifiable methodology for building a MOOC. The final presentation of Head Start Online was influenced by a number of factors such as: pre-existing knowledge of how to create larger credit-bearing online courses; MOOCs that team members had taken on different platforms; review of other pre-induction socialisation MOOCs specifically; advice from our MOOC platform (see below) contact; an intensive MOOC design workshop with Yishay Mor; and trial and error while developing the MOOC on the platform. While this approach fits with the spirit of a design based research approach reflection is needed on what the best methodological approach is for developing a MOOC. The decision to have the first run of the MOOC be a pilot with a small number of participants (approximately 150) allowed that pilot to itself be part of the MOOC development process, and this is something that the development team found valuable.

The Structure of Head Start Online

The Head Start Online course is developed on a new Moodle-based platform, DCU Academy. The MOOC runs over a total of five weeks. Before Week One is officially launched, a welcome area is provided. This area contains a brief course overview and instructions relating to setting up a course profile. The total time commitment for participants is two hours per week; this may vary as there are additional optional activities at the end of each week. At the beginning of each week, a new section of the course is released and made available to participants. Even

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though the sections of the course are released on a weekly basis, participants are not expected to complete the course so stringently. Participants are free to complete the course at their own pace, or begin the course later than the initial launch.

There are five sections to the course:

1. A good beginning – What is this course about? Who else is here?
2. What to expect – What should you expect of part-time/online learning?
3. Time is precious – How much time do you have for study? What supports do you have in your life?
4. Skills for success – What computer skills do you need? What is required to produce a successful assignment in your first semester of study?
5. Next steps – Where next? Is online learning for you? What will you decide to do?

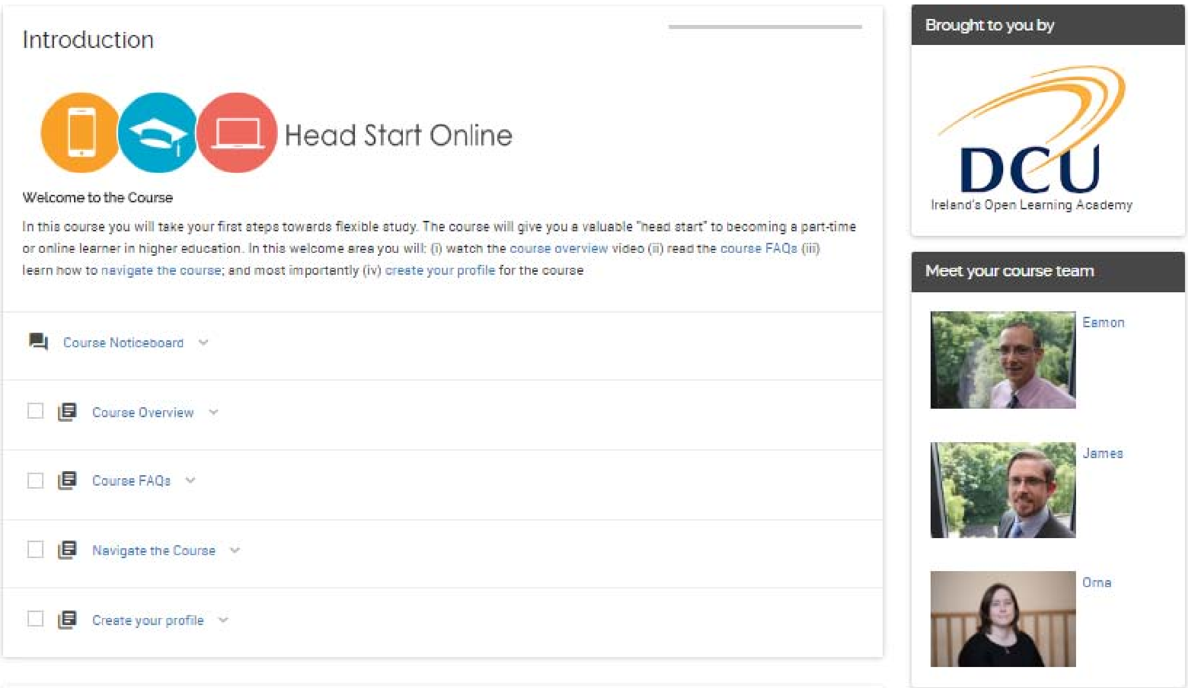

Figure 1.

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Student Success Toolbox Activities

Am I Ready for Study?

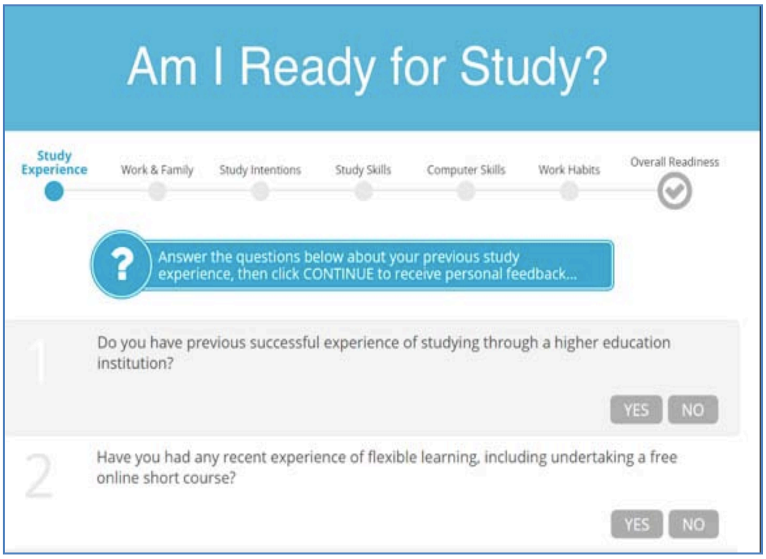

Figure 2.

Contained within Week Two of Head Start Online, this activity enables course participants an opportunity to self-assess whether they are ready to commence part-time online/distance study. A quiz consisting of six sections addressing relevant issues is presented: (a) Previous Study, (b) Work and Family, (c) Study Intentions, (d) Study Skills, (e) Computer Skills and (f) Work Habits. Upon finishing each of the aforementioned quiz sections and the quiz in its entirety, personalised feedback is delivered to participants (e.g., "you probably need to talk with your close family and friends. It's really important that they understand why you're thinking about undertaking further study…"). Essentially feedback is provided from two distinct standpoints: (a) the educational institution and (b) former/current flexible learner.

Do I Have Enough Time?

Figure 3.

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Week Three offers a self-reflective *life calculator*, helping the course participants to assess the amount of the time they spend on various activities during a typical week. This helps them to gain a realistic perspective on whether they have enough spare time for study whilst balancing their current life, work and family commitments. Having calculated how users spend their time currently under six sections (a) Work, (b) Family, (c) Household, (d) Hobbies, (e) Leisure and (f) Sleep, feedback is then provided as to whether they have adequate time for flexible study (e.g., You can probably go ahead and register for your course but don't forget to talk with the staff and check the requirements for the particular programme of study you wish to undertake).

Who Can I Ask?

Figure 4.

Also within Week Three participants interact with a tool designed to get them thinking about their support network and how they might garner support in order to assist them in their progression through their studies. Information slides detail methods of finding support from Friends, Family, Employers, Universities and Other Students. Examples of students in both supported and unsupported scenarios are displayed, and advice for those lacking in support is also provided. Lastly, a series of typical student support problems coupled with information on how various support outlets may be of assistance are demonstrated (e.g., Problem: I am struggling with the technology on this course, Other Students Solution: Other students may be a good source of help with technology problems as they may have experienced similar problems themselves. However be careful not to share your user name and password with anyone.)

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My Computer Skills: Am I Computer Ready to Learn?

Figure 5.

Week Four grants course participants the opportunity to hear from a student narrator regarding the vital computer skills required for higher education. The guidance is personalised, in that the user indicates their level of computer skills at the beginning of the tool. Both the technology services offered by higher education institutions and the necessary technology flexible learners typically use are communicated. Prior to starting the computer skills quiz itself, participants can access four student stories detailing first encounters with email services, online reading materials, Microsoft Word, and Microsoft PowerPoint. The first section of the quiz itself contains three fundamental questions, if a participant answers no to any of these questions; they are directed to online resources that can help learners improve their computer skills. Those who answer yes to all three of the fundamental question are directed down an alternative pathway with questions relating to word processing, file management, and using the internet.

My First Assignment

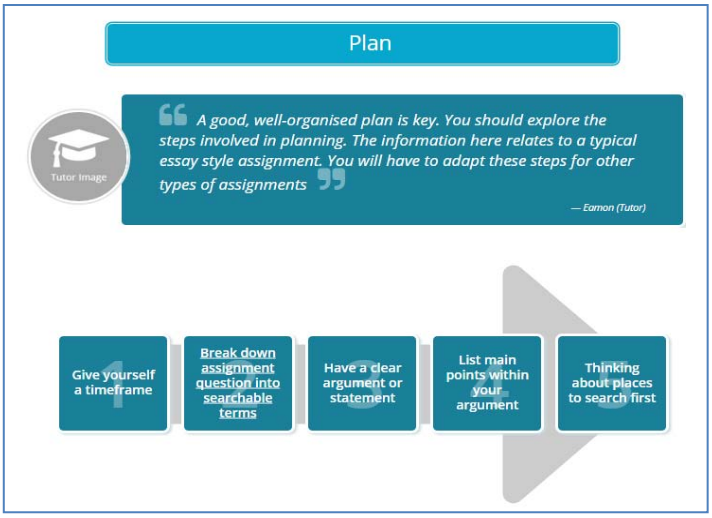

Figure 6.

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Also within Week Four, participants are guided by a student narrator in relation to what it is like to tackle a first assignment in higher education. Four different navigation pathways through the tool are provided for users depending on their previous experience with higher level assignments. Helpful information on developing and planning an assignment is communicated. Other students' perspectives are also given throughout the tool through quotes in order to heighten participants' sense of what it is like to be faced with an assignment in higher education for the first time.

Other Features

Graduate Voices

Figure 7.

During the development stage of Head Start Online, members of the research team observed similar MOOCs (e.g., Australian Government funded *What's Uni Like?* and Future Learn's *Get Started with Online-Learning*) in order to gain insight into what elements were necessary to include. Continually, from the team's own perspective and also from that of course participants' view displayed on various forums, Vox Pops detailing the stories of real university students were extremely beneficial. With this in mind, the *Graduate Voices* videos were developed to establish a comparable advantageous element to Head Start Online. Here, via YouTube videos embedded in the platform, course participants can access advice from flexible course graduates and learn how their managed to navigate their progression through online study. The videos are situated appropriately in the course so that they complement the respective week's theme. For instance, in Week Two: What to Expect, a graduate details her online study story from the beginning when she did not know what she was facing into, and in Week Three: Finding the Time another graduate discusses how she had to become more organised in order to be able to study, and gives some advice on time management.

Live Discussions

It was decided that a live discussion, whereby three of the course facilitators would interact with course participants, would be conducted every Friday at 14:00 for the duration of the five week course. The chat sessions last 30 minutes and provide a platform for the participants to raise any queries they have and get an immediate response. Equally it grants course facilitators

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the opportunity to access immediate feedback about various elements of the course (e.g., What aspects of the course are you enjoying? What could be improved about the course?). The chat sessions prove to be an appropriate way to round off each week of the MOOC and they also motivate participants to complete the week's previous activities and fully interact with its content, as they will more fully benefit from the chat sessions having done so. Notably, the chat sessions saw high levels of engagement from course participants, with large proportions of the total number enrolled tuning in each week.

Recap Videos

Figure 8.

At the start of each new week, before the participant explores that week's content, they encounter a recap video. The video is a reminder of what was covered in the prior week and allows users to reflect on their previous completed activities and what they have learned. The recap video also aims to ease participants into the new week as opposed to immediately presenting them with new content. Within the video, a course facilitator summarises: the amount of activities completed, what these activities entailed, the messages communicated in videos and interesting content contributed by participants. This element of the course was also used as an opportunity to remind participants to use the Share with Others box should they have any queries for the course facilitators or their fellow prospective learners.

Next Steps

This pilot phase testing of Head Start Online is crucial for the continual enhancement of the platform. A data collection and analysis strategy has been prepared in order to elucidate salient questions related to the course (e.g., What activities did people complete vs. not complete? What type of participant was more likely to progress fully through the course?). All of the above findings will inform the first full running of Head Start Online in early 2017. Disseminating MOOC information and results related to the pilot testing has also been established as a top priority by the research team. National and international conferences have been attended in order to garner interest in the MOOC over the past year and a similar strategy will continue to be employed over the coming months. What's more, Head Start Online and the associated findings will produce a considerable amount of published empirical

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work. This is an important contribution of the MOOC as there is an evident gap to be filled in the literature in relation to the use of digital tools to facilitate flexible learner transition into Higher education

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CARROTS AND STICKS: WORKLOAD AND PERFORMANCE MANAGEMENT IN ODL

Thomas Hülsmann, Mpine Makoe, Britta Zawada,
University of South Africa (UNISA), South Africa

Summary

An analysis of activity-based time capturing at UNISA (University of South Africa) indicated that over time the academic administration of academics increased disproportionately to the time spent on core academic tasks such as tuition and research. To investigate this problem, data on activities and time spent on these activities were collected from academics across all levels in the College of Human Sciences (CHS) at UNISA. Content analysis revealed that academic administration at all academic levels is indeed encroaching on core academic tasks. Academic administration is, however, not acknowledged as part of the Key Performance Areas (KPAs) of academics which are measured purely based on the outcomes, such as research papers published and student success rate, and not on their actual daily activities. Core academic activities such as research are increasingly pushed into evenings and weekends, and community engagement is put on the backburner due to more immediate demands. Academics recorded working on average 8.6 hours on a typical day with a typical distribution of 3.7 hours for tuition, including postgraduate supervision (43%), 2.2 hours for academic administration (25%), 1.4 hours for research (17%), 1.2 hours for academic citizenship (14%), and 0.1 hours for community engagement (1%). Finally, this study recommends the alignment of the actually experienced academic activities with the outcomes-based performance measurements.

Introduction and background

Higher education globally is under pressure "to do more with less", in other words, to increase internal efficiencies by achieving increased outcomes (such as can be measured in student success and research outputs) without increasing costs. Examining workload can assist university managements in determining the degree to which academics can successfully perform their job to meet their strategic missions, as well as to meet the performance requirements of the university. Academic workload (WL) refers to the nature and extent of what academics do, i.e. what kinds of tasks they perform, how many of these tasks they perform and how much time it takes. Managing workload, according to Graham (2015), has positive impacts on how individuals perform in their roles. All academics are expected to work across three domains: teaching, research and community engagement and each one of these have specific tasks attached to it. In an ODL institution, like UNISA, time devoted to teaching includes the development of study material, preparing tutorial materials, setting examinations, reading and marking assignments and examinations, supporting students through responding to emails and telephones and supervising postgraduate students. Time spent on all activities leading to scholarly outputs is referred to as research. Community engagement performance is not as clearly defined as the previous two. Yuker's (1984) description of the different academic tasks is similar to the ones UNISA uses. He, however, also includes time spent on activities that contribute to the professional knowledge of an academic and this involves "reading material related to the profession, attending professional meetings, taking courses, and engaging in discussions with colleagues" about issues in the field (Yuker, 1984; p.2). All these activities are linked to the performance of an individual academic. Through performance management systems, employees are measured according to the university's expectations.

Performance depends on a long list of factors including system's design, implementation, workload to which it is subjected, metric used in the evaluation and the interaction between all these factors (Parsons, 2000; Yuker, 1984). Although all these factors are important to evaluate performance, this study will be based on the premise that increased workloads affect performance. It is crucial for studies on workload to analyse the distribution of work, availability and distribution of resources, resource use, as well as the skills and competencies that are required for each job. This will be done through analyzing tasks related to teaching, research and community engagement and the time spent on each task. The focus will be on the amount of time academics spend on each of these tasks as agreed upon in their annual performance agreements.

Every year, UNISA academics are expected sign a performance contract based on a centrally determined template which specifies the activities of the Key Performance Areas (KPAs) of academics. These activities include academic leadership (for senior positions), teaching and learning, research, community engagement and academic citizenship. The weight for each academic KPA differs according to the rank of the academic (full professor, associate professor, senior lecturer, lecturer, junior lecturer). Workload allocation (WA) refers to the way in which work load is allocated by a manager to an employee or a group of employees, in the case of higher education usually a Chair/Head of an academic department allocating tasks to academics, to ensure that all the work is done, as well as to ensure that there is a fair distribution amongst academics, as well as an appropriate allocation according to levels of seniority. Kenny & Fluck (2014; p.601) refer to the under-researched nexus between the manageability of academic work, and the quality of teaching and research outcomes, and state that academics need to be consulted, and that realistic time allocations "which reflect what academics actually do" should be agreed on to ensure their wellbeing and the quality of their work. The importance of time allocation for tasks is also reflected in the management literature (Claessens, 2007; p.255, p.272) as an important aspect of managing one's own time to job satisfaction.

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Activity-Based Time Capturing (ABC)

In an attempt to verify the allocation of staff funds to the actual activities performed by academics, UNISA collects information through Activity Based Costing (ABC) – a time capturing method in which academic staff members are expected to fill in a break-down of their activities and tasks per year in terms of the percentage of their time spent on pre-set activities. Activities are broken down according to the main academic activities: Core Academic (such as course development, tuition, community engagement and research), Academic Support (such as academic administration, academic personnel development, community outreach and executive management participation). The break-down is done numerically in percentage terms, and academics are invited twice a year to complete and submit an overview of their percentage time for that semester. Course and curriculum development, as well as tuition and academic administration are linked to specific course codes. This time-capturing method does, however, have its challenges and weaknesses including the fact that some academics resent it as a form of managerialism in the academic sector. A further drawback of this type of reporting is that time is captured by academics in perceived percentages of overall time spent, after the fact, and that there is therefore no indication of the actual substantive hours that academics work. The time capturing also requires the contracted working time of a semester to be reported across 200 items. This is likely to lead to considerable inaccuracies. More proper recording that is based on daily or weekly timesheets are likely to be even more cumbersome and may not lead to more accurate information. Despite some of the inaccuracies regarding this time-capturing system, it shows that there is a shift from activities related to core academic to the activities on academic support, and particularly to administration. Table 1 below indicates the shift in academic processes from 2009 to 2013 (adapted from Du Plessis & Bester, 2014).

Table 1: Shift in academic processes 2009-2013

Process	2009 %	2010 %	2011 %	2012 %	2013 %
Core Academic	67.5	64.2	66.7	66.6	60
Course and curriculum development	3.6	3.5	3.9	3.8	3.5
Community engagement	5.4	5.3	5.3	5.1	5.2
Research	21.6	20.5	19.6	21.1	18.9
Tuition	36.9	34.9	37.9	36.6	31.4
Academic support	32.5	35.8	33.2	33.5	40.8
Academic administration	26.5	29.1	25.9	26.1	33.8
Academic personnel development	3.1	3.4	3.7	3.6	3.1
Community outreach	1.3	1.8	2.1	1.8	1.9
Executive management participation	1.6	1.5	1.5	2	2
Grand total	100	100	100	100	100

From Table 1 it is clear that most of the processes (such as course and curriculum development and community engagement) had stayed relatively stable, whereas Tuition (which includes developing study material, assessment and student interaction) had dropped from 36.9% to 31.4% and academic administration had increased from 26.5% to 33.8% (which includes assignment, examination and tutor administration; as well as the recruitment,

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appointment and training of markers and tutors). The report continues to conclude that a "significant shift that took place in the balance between the core academic activities (being defined as teaching, research, and community engagement and course and curriculum development) on the one hand, and academic support (specifically academic administration) on the other hand" (Du Plessis & Bester, 2014, henceforth ABC Report). These findings are similar to what was found by Watanabe, Murasawa, and Abe (2013) who reported that the work content of Japanese professors has shifted considerably from teaching- and research-oriented activities towards more administrative and service-related tasks.

Integrated Performance Management System (IPMS)

Performance is affected by and large by the systems' design and implementation, workload to which it is subjected, metric used in the evaluation and the interaction between these factors (Parsons, 2000; Yuker, 1984). The starting point of a performance management system, according to the UNISA Integrated Management Systems (IPMS) framework is to ensure that the strategic objectives are linked to the outputs of the university. Performance management is about integrating an individual's performance and the institutional strategy (Seyama & Smith, 2015). Molefe (2012) argues that performance measurement is designed to focus the employee's attention on what the university considers important. Managing performance in an academic environment is, however, a complex issue. What makes it more complicated is that performance was brought into higher education from "the commercial environment, and therefore generally viewed with high degree of suspicion by academics" (Parsons, 2000; p.7). Secondly, performance management is about measuring specific quantifiable outcomes that can be easily rewarded. In higher education, performance is based on output measures such as pass rates and research outputs. These types of reward systems tend to focus only on the output of an activity rather than on the process, time and effort required to achieve such an output, e.g. innovative activities in teaching may not considered if they do not lead to better success for students.

Methodology

In this study, the activity-based time capturing report at UNISA is used as a baseline survey, which was then followed up with a particular case study using the following methodology. The College of Human Sciences (CHS) at UNISA was identified a case study and ethical clearance was obtained from the university to conduct this study. All academics in CHS received an email with a letter requesting them to document a typical 24-hour work day in their own words, and to send this email to the research assistants in the study. Even if the data was not entered equally regularly in all instances, it was deemed to be relatively accurate, because the time between the event and its recall was short and limited to a specific time period.

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The research assistants then followed up this received email with a telephone interview to clarify the submitted time and task allocation and for the academics to comment on any aspects of their task and time submission and their perceptions of workload. It was felt that asking academics to record their tasks and time spent over a protracted period of time would be too intrusive, as well as contributing to the actual problem of increasing administration for academics. Despite a number of requests, there was a very low response rate. The major problem with this technique is academics' unwillingness to devote the time and effort required to complete a diary. This negativism is particularly acute if the academics are requested to continue the diary over a long period of time (Yuker, 1984). Nonetheless, a time and task analysis of the submitted data was done, and a thematic content analysis of the comments was concluded.

Description of data

Summarising the data was used as a starting point in order to define the classification of tasks, followed by reporting on the collected data for each set of tasks for all the three main groups of staff members (Professors = Peromnes level 5 & 6; Senior lecturers = Peromnes level 7; and Junior lecturers = Peromnes level 8 & 9). In the second step, we discuss the relation with the perceived workload to the KPAs used for staff assessment.

Perceived workloads by categories of staff

We use the following classification of tasks:

- AC = Academic Citizenship: Meetings; reviewing for journals; editing journals; external examining;
- AA = Academic Administration: exam-concession administration; reporting; emails; NRF rating; academic administration;
- CE = Community engagement;
- R = Research: Reading, writing, conferences; discussion about projects; fieldwork; data collection; academic networking for a project;
- T = Teaching: curriculum development; writing study material; reading for teaching; exams; marking; supervision.

In the first group, 20 professors responded and provided us with a detailed description of a randomly selected working day. Based on the descriptions we allocated time (hours) to each category of activities described.

Table 2: Workload distribution (Professors; level 5 & 6)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Av.
AA	5		1.5	2	2	4	2.5	3.5	2		1.5	0.5	1	3	1	2	7.5	1	1.5	2	2.12
AC		0.5	1	1.5	3.5	5	2.5		3.50	2	2		0.5	2.5	0.5	2	1	1	1.5		1.53
CE	2						0														0.1
R			4.25	4	4		1.5			3	4.5			2		2		2	7.5	12.5	2.36
T	2,5	9	1.25		1		2	6.75	6.00	7	1.5	9.5	7.5	1	9	2.5		3	3.5		3.65
H	9,5	9.5	8	7.5	10.5	9	8.5	10.3	11.5	12	9.5	10	9	8.5	10.5	8.5	8.5	7	14	14.5	9.81

The first column in Table 2 should be read as follows: Professor 1 reports having spent 5 hours on academic administration (AA); no time was allocated to academic citizenship (AC)

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that day, two hours were dedicated to community engagement (CE); no time to research, and 2.5 hours to teaching. Altogether the first professor reported having worked 9.5 hours (H) that day.

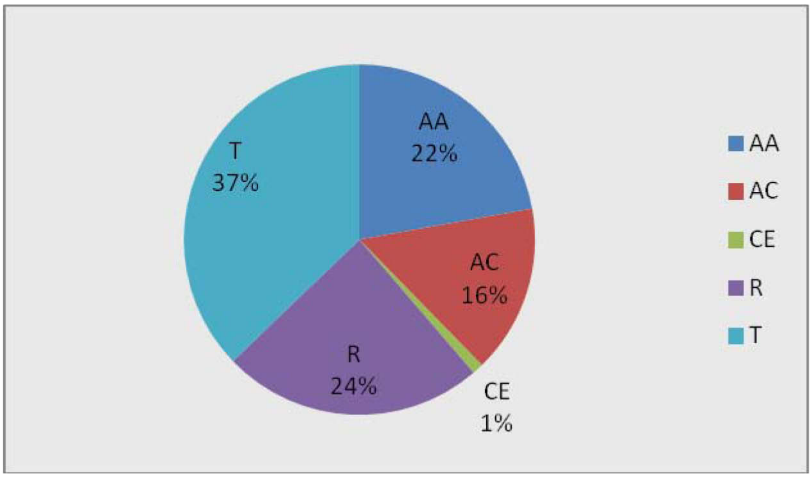

Figure 1. Workload distribution (Professors)

The random snapshot of workload distribution provided by our sample suggests that academic administration takes 22% of professorial time; more time than allocated to research. Professors' community engagement plays a marginal role in their time allocation.

The distribution is markedly different for Senior Lecturers. Table 3 shows that Senior Lecturers are the work horses of the institution with regards to teaching. Interestingly they also report doing even more administration than the professors. In spite of the fact that they need to build up their research profile, research on this level is down to a 13% level.

Table 3: Workload distribution (Senior Lecturers)

	1	2	3	4	5	6	7	8	9	10	Av
AA	4.5	1		3	0.5	2	4	1.5	4	5.5	2.6
AC		1	0.5		1.5		2	1			0.6
CE									1		0.1
R	1	3	0.5		3	2.5	2.5		1		1.35
T	2.5	2	8.5	6.5	5	7	1.5	8	3.5	1	4.55
H	8	7	9.5	9.5	10	11.5	10	10.5	9.5	6.5	9.2

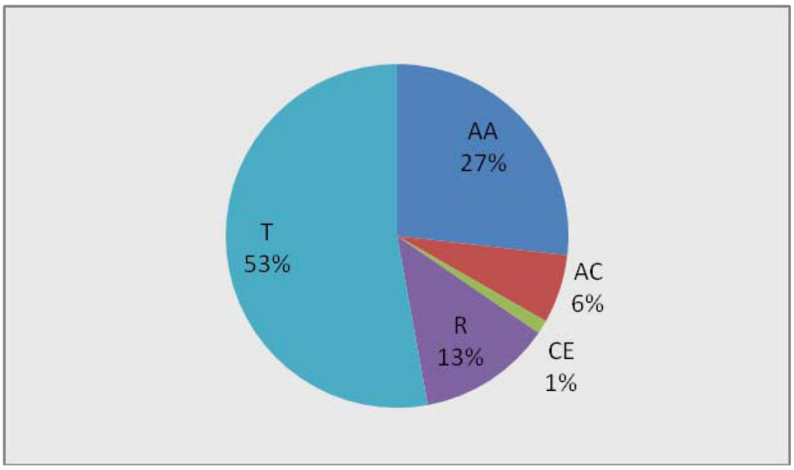

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Figure 2. Workload distribution (Senior Lecturers)

Table 4 shows the workload distribution reported by (Junior) Lecturers. They share with the Senior Lecturers that they have a high teaching load. Interestingly, the share in AA is similar across the three different categories.

Table 4: Workload distribution ((Junior) Lecturers)

	1	2	3	4	5	6	7	8	9	10	11	12	13	Av.
AA	2.5	0.33	1.5	0.25	4.33	1	2.25	0.75	3.5	4	4.75	3.25	1	2.26
AC			0.5	4.75	0.5		1		3	4		1.5	2	1.33
CE				0.5	0.5							0.67		0.13
R	0			2	2	1	0.25		2		1.5			0.67
T	8	5.25	6.5		3.25	5.5	3	6.25	2		1	4.5	6.25	3.96
H	10.5	5.58	8.5	7.5	10.58	7.5	6.5	7	10.5	8	7.25	9.92	9.25	8.35

The fact that (Junior) Lecturers report low research engagement may be due to their perception that, for instance, doing a PhD is not seen as research, because they themselves are in the role of apprentices rather than researchers.

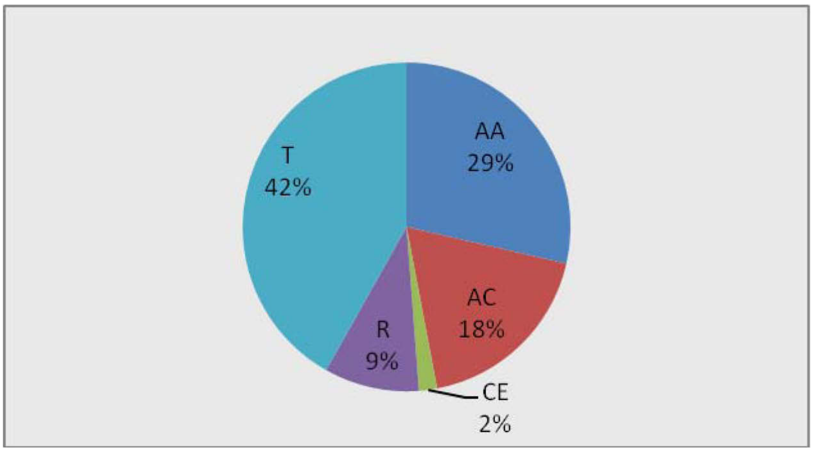

Figure 3. Workload distribution ((Junior) lecturers)

The next figure compares how the five workload categories are distributed among the three categories of employees: It confirms that in terms of teaching the Senior Lecturers are the work horses of the institution. Somewhat contrary to expectations it seems that all groups report as having about a third of their time to deal with administrative issues. Contrary to expectation because one would have expected professors would carry the main load of administrative work.

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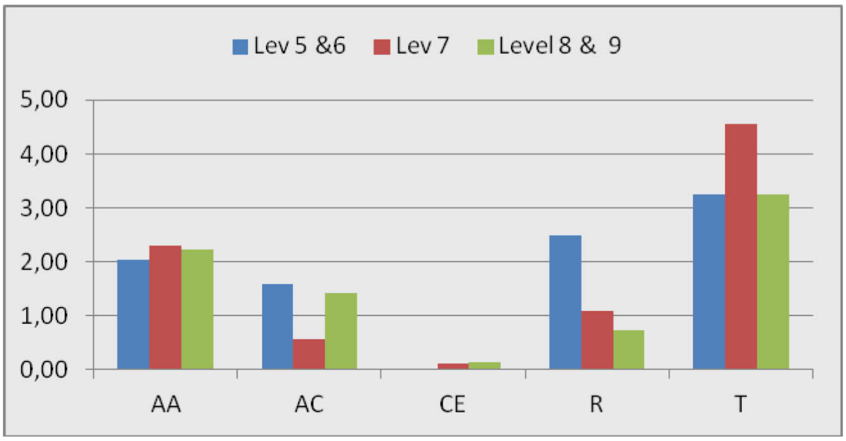

Figure 4. Overview of time spent on academic activities

More in line with expectations is that professors are able to dedicate more time to research than other staff members. Remarkable is that community engagement is a marginal activity, especially in this college in UNISA that has the most CE projects registered in the university. We can now look how the actually reported activities relate to the expected performance.

Key Performance Areas (KPA) requirements

Figure 4 confirms that across the different staff levels much time (between 20 and 30%) is allocated to academic administration. Our findings are in line with the trend identified by the time-capturing research cited earlier (Du Plessis & Bester, 2014) which confirms that the academic administration (AA) is increasingly encroaching into core academic activities. Table 5, however, shows that AA, in spite of absorbing a large part of academic time across all staff categories, does not figure in the KPA structure at all.

Table 5: KPA requirements

%	Level 5 & 6	Level 7	Level 8 & 9
AL*	5 to 10		
AC	5 to 15	0 to 10	0 to 15
T	30 to 50	30 to 60	30 to 60
R	30 to 50	30 to 50	30 to 50
CE	10 to 20	10 to 20	10 to 20

Notes: * AL = Academic leadership which applies to professors only

Given the increasing role of AA this neglect creates considerable frustration. It is necessary to align the KPA requirements better to the actual work done by acknowledging AA as part of the academic workload.

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Comparing the expected time allocation as expressed in the KPA distribution, the following observations can be made:

- The reported time allocation for professors (Levels 5 & 6) is in line with the KPA requirements in teaching (T) and Academic Citizenship (AC); research (R) is slightly below expectation while Community Engagement (CE) is way below expectation as expressed in the KPAs.
- For Senior Lecturers (Level 7), AC is in line; T is in line; R is considerably below expectations; CE is considerably below expectations.
- For (Junior) Lecturers, AC slightly above expectation; T in line with expectations; R considerably below expectation; CE is considerably below expectations.

Two general remarks: AA does not figure in the KPA but it figures in all categories as a major workload item (about 20 to 30% across categories); considerable work is done while no expectations of substance or excellence in academic administration are expressed in the KPAs. On the other hand KPAs express all academics to dedicate 10 to 20% of their time to CE. All staff categories underperform considerably in this respect. This may be due to lack of clarity what is expected in this category, or simply to work overload.

Performance management and workload

This study reveals that the tasks and time spent by academics triangulates very well with the data in the ABC Report (Du Plessis & Bester, 2014). What should be noted though is that these two data sets capture the *activities* that academics report, and could therefore be referred to as descriptive. In contrast, the performance system is results-driven and focuses on the *expected outcomes* of these activities, rather than on the activities themselves, and could therefore be described as normative. The descriptive narrative of the academics' tasks and time in this study (in percentage terms) correlates well with the normative outcomes expected in the performance system in terms of tuition, research and academic citizenship. Typically, these three activities and outcomes make up what is generally understood as scholarship and the kudos that academics strive for to be known as experts in their fields; the carrots inherent in the profession (scholarly standing), as well as the carrots in terms of monetary rewards in terms of promotion and performance bonuses. The sticks in this environment are the unremitting pressure to achieve the expected normative outcomes or lose out on performance bonuses, at the same time being hampered by approximately 25% of work time being unacknowledged and unrecognised.

There are, however, two major areas of discrepancy, namely community engagement (CE) and academic administration. This study shows that academics are able to spend very little time on community engagement which is identified as a core activity and KPA (1% of time is spent on CE in the descriptive analyses and 5-15% in the KPAs). Typically, CE is put on the back-burner if time runs out since there is no direct measurable reward; i.e. there is no carrot for the individual. There is also no carrot for the institution since it is not funded by subsidy as tuition and research is.

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A significant finding of this research is that academic administration takes up 25% of academics' time in any typical day, which is not accounted for at all in the performance management system. The aim of performance management systems is to measure individuals' performance and reward them accordingly (Ngcamu, 2013; Parsons, 2000). These rewards are often related to the key performance areas of an individual. Some of the rewards (referred to as carrots) can be financial in the form of salaries or bonuses and non-financial such as skills upgrade or career development. If Academic Administration is not measured, there is no recognition and there are no rewards for the work performed in this area, meaning that there are no carrots.

In the course of this study it also became clear that the normative results-driven performance management system (managed by Human Resources (HR)) and the descriptive activity-based time capturing (initially conceived as activity-based costing managed by Finance) do not speak to each other in a way that enhances both management instruments. The two processes are completely distinct, managed by different units in the institution (HR and Finance), run according to different time lines and generally resented by academics.

A major recommendation of this study is therefore that the descriptive ABC and the normative IPMS are aligned in the following ways. Firstly, the timelines for the two systems should be aligned closely so as to allow the two instruments to speak to each other. Generally, the performance agreement for a staff member is negotiated and signed in January of a year, with a mid-year review taking place in June, and the year-end performance assessment in November. The activity-based capturing is usually only done the following year, and is usually done by memory and perceived percentages. It is proposed that the activity-based time capturing should be done in May for the first semester and in October for the second semester, and for the results per person and per department to be made available to the line manager as an input into the performance-management discussions. By deliberately aligning the two tools more closely, it is likely that the quality of the ABC data will also be improved.

Conclusions and further research

Our analysis revealed that, at this time juncture in the mega-ODL institution that is UNISA, academic administration at all academic levels is indeed encroaching on core academic tasks. Academic administration is, however, not acknowledged as part of the Key Performance Areas (KPAs) of academics which are measured purely based on the outcomes, such as research papers published and student success rate, and not on their actual daily activities. Core academic activities such as research are increasingly pushed into evenings and weekends, and community engagement is put on the backburner due to more immediate demands. Academics recorded working on average 8.6 hours on a typical day with a typical distribution of 3.7 hours for tuition, including postgraduate supervision (43%), 2.2 hours for academic administration (25%), 1.4 hours for research (17%), 1.2 hours for academic citizenship (14%), and 0.1 hours for community engagement (1%). Finally, this study recommends the alignment of the actually experienced academic activities with the outcomes-based performance measurements.

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The findings presented in this paper may lead to further research, such as the following:

- To what extent is (more) academic administration inherent in ODL (as opposed to residential universities), and what effect does this have on staff morale and academics' sense of job satisfaction at ODL institutions?
- How do these findings compare with findings in similar mega-ODL institutions globally, or with residential universities in South Africa?
- What would academics consider to be (a) appropriate time spent on academic administration, (b) appropriate measures of performance for academic administration, and (c) appropriate rewards for academic administration?
- To what extent is the increase in academic administration linked to increased student numbers, increased expectations for reporting and audit requirements in higher education, increased use of technology sometimes perceived as being ineffective?
- To what extent does the increase in academic administration result in resentment and poor working relations between academics and support staff?

In terms of the methodology used in this paper, it is clear that academics resent all requests to capture their time and activities, and view it as adding to the administration which is already a negative. The voluntary sampling done in the College of Human Sciences does, however, confirm that the ABC is to some extent reliable and provides valuable information that may be enhanced if it could be linked to the performance management system.

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ONLINE LEARNING IN COMMUNITY COLLEGES OF THE STATE UNIVERSITY OF NEW YORK: INITIAL RESULTS ON DIFFERENCES BETWEEN CLASSROOM-ONLY AND ONLINE LEARNERS

Peter Shea, University at Albany, State University of New York,
Temi Bidjerano, Furman University, United States of America

Summary

Using data from 41,616 students in all 30 institutions within the community college system of the State University of New York this study employs structural equation modelling to compare online and classroom course and program level outcomes. Specifically, we compared GPA and degree attainment for classroom-only students and students with online coursework. Results indicate that online coursework reflected slightly lower GPAs but students with some online coursework were significantly more likely to attain a credential than classroom-only students.

Introduction

The convenience and flexibility of online education makes it an attractive option for an ever growing population of non-traditional students to participate in and gain the benefits of higher education. Some researchers, though, have expressed concerns about the match between the needs of many non-traditional students, especially students at risk of failure, and the demands of distance education. Community college students are a population frequently the subject of such concerns. For example, researchers at the Community College Research Center (CCRC) conducted state-wide studies in southern (Jaggars & Xu, 2010) and western (Xu & Jaggars, 2011) US community college systems and found that failure and withdrawal rates were significantly higher for online courses than for face-to-face courses in the community college systems they studied. Additionally, these researchers concluded that students completed online course sections were 3 to 6 percentage points less likely to receive a C or better than students who completed face-to-face course sections (Jaggars & Xu, 2010). Further, program level outcomes were also problematic. Students in both community college systems who took one or more online courses in their first semester were 4 to 5 percentage points less likely to return for the following semester (Jaggars & Xu, 2010). Students who took a higher ratio of credits online were also less likely to earn a degree or transfer to a four-year institution than students who took a lower proportion of online credits (Xu & Jaggars, 2011).

Finally, achievement gaps widen between males, lower-performing students, and majority and minority students in online coursework (Xu & Jaggars, 2013).

Overall however the research is mixed with regard to outcomes of online learners in community colleges. In contrast to CCRC studies, other researchers, using a large, multi-state, federated data set of more than 600,000 students in the Predictive Analytics Reporting Framework (PAR) found that taking some online courses did not result in lower retention rates for students enrolled in primarily on-ground community colleges (James, Swan, & Daston, 2016). The authors found no differences in retention between delivery mode for students enrolled in primarily on-ground four-year universities, while at primarily online institutions, students taking some online and some classroom courses had slightly better odds of being retained than students taking exclusively on ground or exclusively online courses. Age, however, did differentially affect delivery mode effects.

At the program level there is evidence students who take online courses attain degrees at higher rates than classroom-only students, despite lower course level performance. In studies at both the state level (Johnson & Cuellar Majia, & Cook, 2015) and national level (Shea & Bidjerano, 2014) authors found that students who took at least some online courses were more likely to earn an associate's degree or transfer to a four-year institution than those who didn't net of other differences. The current study investigates related questions with a third large data set representing students in the 30 community colleges in SUNY. Specifically, in this analysis we look at outcomes that have not yet been investigated including measures of overall performance of students taking some online courses reflected in grade point averages (GPA). If participation in online education is a cause for concern, as has been found among students in southern and western states, it is likely to be evident in the grade point averages of community college students who enrol in at least some online coursework. We also sought to understand variables that predict differences in GPA between online and classroom-based courses and whether online students are more likely to attain a degree than classroom-only students.

Purpose and Research Questions

- RQ1. Do students who have experiences with both online and classroom courses in a given semester tend to earn lower GPAs in online courses relative to classroom courses?
- RQ2. What are the predictors of the difference in student online and classroom GPA?
- RQ3. Do students who take online courses attain degrees at higher rates than classroom-only students?

Method

The sample was derived from the cohort of 41,616 community college students in the State University of New York (SUNY) who first enrolled in an associate or a certificate degree program in the fall semester of 2012. Students were enrolled in one of the 30 community colleges in the SUNY system. Select demographic characteristics are given in Table 1. Sample

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members were tracked over seven semesters excluding the summer months. To address the study research questions, we selected subsamples of students who had both online and classroom coursework in any given semester. The analytic samples varied from semester to semester due to the fact that there was no continuity in course taking patterns for the cohort.

Table 1: Student Demographic Characteristics: Variable Means and Proportions by Semester

		Fa 12	S 13	Fa 13	S 14	Fa 14	S 15	Fa 15
Female		.52	.57	.59	.58	.60	.59	.60
Age		21.47	20.99	20.67	20.4	20.64	20.45	20.22
Race	White	.74	.75	.76	.76	.72	.69	.69
	Asian	.03	.02	.02	.02	.03	.03	.03
	Black	.10	.10	.08	.08	.10	.12	.10
	Hispanic	.10	.09	.10	.09	.12	.13	.14
	Other	.03	.04	.04	.04	.04	.03	.04
Goal	Transfer	.27	.31	.34	.37	.33	.35	.36
	Degree	.15	.15	.14	.13	.13	.14	.12
	Job	.14	.13	.14	.13	.14	.13	.12
Remedial		.43	.43	.42	.42	.51	.54	.51
Program	Cert	.04	.03	.03	.96	.02	.02	.02
	AA	.93	.96	.96	.02	.89	.83	.71
	BA	—	—	.01	.01	.08	.13	.25
Full-time		.91	.91	.91	.91	.83	.80	.76
Pell		.53	.54	.49	.47	.49	.50	.43
Institution	Suburban	.64	.59	.58	.58	.66	.68	.74
	Large	.60	.53	.51	.49	.55	.56	.54
	Gr. Rate	22.34	22.91	23.06	23.34	25.1	26.35	31.32
	4-Yr	—	—	.01	.01	.08	.13	.25
Degree		.24	.31	.42	.50	.44	.38	.23
N		3,867	4,914	4,713	5,385	3,566	2,976	1,899

Note. Proportions do not sum up to 1.0 due to rounding; Age = Age as of September 2012; Goal = Student goal as of fall 2012; Remedial = Qualified for remedial coursework in Fall 12; Cert = Enrolled in a Certificate degree program; AA = Enrolled in an Associate degree program; BA = Baccalaureate Degree Program; Pell = Pell grant recipient; Gr. Rate = Institution graduation rates for the cohort of 2011; 4-Yr = 4-year institution; Degree = attained a degree by Fall 2015.

In addition to GPA obtained in online and classroom courses, we considered the following variables at various stages of the analysis: (a) student demographics: race, gender, age, academic ability (whether the student was enrolled in a remedial/ developmental course in his/her first semester in college); (b) semester enrolment information: type of academic program (Certificate, Associates, or Baccalaureate), full-time status, financial need (Pell grant recipient vs. not), online load (proportion of online credits attempted), and proportion of credits attempted in the disciplines Humanities, Social Sciences, Professional, and STEM; and (c) institutional characteristics: size (small or large), location (suburban vs. other), graduations rates for the cohort of students immediately preceding the 2012 community college cohort.

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Results

We examined differences between students with a combination of online and classroom coursework and counterparts with no online coursework on key demographic and other status characteristics. Gender, race, status, and financial aid status, and academic ability at entry – Fall 2012 – unvaryingly predicted the likelihood of combined (online and classroom) coursework across all seven semesters. That is, all other being equal, female students, Caucasian students, full-time students, and older students, as well as Pell grant recipients were much more likely to be in both online and classroom-based courses than to be "classroom-only" students in any given semester. Higher academic ability students were also more likely to take a mix of online and classroom courses than to be "classroom-only" students in the earlier semesters.

To address the study central research question (RQ1), we explored mean differences in online and classroom GPA in the context of structural equation modelling (SEM). Preliminary multilevel analyses exploring differences across institutions in outcome measures showed that the amount of variation across institutions is negligible with small design effects (< 2) as well small interclass correlations in the range from .01 to .06 in semesters. Therefore, standard errors were adjusted to account for the nesting of students within institutions with the options for complex samples in Mplus (Muthén & Muthén, 2015). The structural equation model tested in the analyses was conceptually identical to a paired samples t-test (one group of students measured under two different conditions) with two important exceptions. First, unlike the conventional paired samples-t statistic, which assumes no error in measured variables, in our SEM model, the amount of measurement error was controlled statistically. More importantly, the SEM approach allowed inclusion of predictors of the difference between conditions (i.e., online and classroom GPA) which would have been statistically impossible within the framework of the conventional t-test (McArdle, 2009).

Table 2 presents the classroom GPAs of the sample of students in a particular semester and the latent growth factor ($\alpha 1$) – conceptualized as the difference between the students' classroom and online GPAs. As seen, the differences are with negative signs across semesters, results suggesting that students' online GPAs tend to be slightly lower relative to the GPA these same students obtain in classroom coursework. The difference was statistically significant for four of the seven semesters considered (i.e., Fall 13, $p = .002$; Spring 14, $p < .001$; Fall 14, $p = .01$; Spring 15, $p < .001$).

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Table 2: Results from LGC Models of the Comparison between the Classroom and Online Student GPA: Classroom GPA and Difference between Online and classroom GPA

Semester		MLE	Standard error (SE)	p
Fall 12				
	Classroom GPA (α_1)	2.14	.07	<.001
	Latent Change (α_2)	-.09	.15	.536
Spring 13				
	Classroom GPA (α_1)	2.22	.05	<.001
	Latent Change (α_2)	-.17	.09	.077
Fall 13				
	Classroom GPA (α_1)	2.49	.03	<.001
	Latent Change (α_2)	-.13	.04	.002
Spring 14				
	Classroom GPA (α_1)	2.60	.03	<.001
	Latent Change (α_2)	-.15	.04	<.001
Fall 14				
	Classroom GPA (α_1)	2.50	.02	<.001
	Latent Change (α_2)	-.11	.04	.010
Spring 15	Classroom GPA (α_1)	2.47	.03	<.001
	Latent Change (α_2)	-.11	.03	.001
Fall 15	Classroom GPA (α_1)	2.42	.05	.000
	Latent Change (α_2)	-.08	.06	.196

Note. MLE = maximum likelihood estimate; Latent change = difference between online and classroom GPA

In analyses in response to RQ2, we examined predictors of the difference between online and classroom GPA. The model depicted represents an extension of the previous model. The model evaluates the effect of a factor on both the initial level (classroom GPA) and the difference between classroom GPA and online GPA. Table 3 shows the results for the four semesters in which the difference between classroom and online GPA from the first model (RQ1) was statistically significant. Predictors were evaluated simultaneously.

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Table 3: Results from LGCM: The Effect of Covariates on the Difference between Classroom and Online GPA

Predictors of Classroom GPA	Fall 13		Spring 14		Fall 14		Spring 15	
	γ_0	s.e.	γ_0	s.e.	γ_0	s.e.	γ_0	s.e.
White	.27***	.03	.25***	.03	.26***	.03	.26***	.03
Female	.21***	.01	.21***	.01	.18***	.02	.15***	.02
Age	.02***	.00	.02***	.00	.02***	.00	.01***	.00
Rem	− .48***	.02	− .47***	.02	− .30***	.03	− .23***	.02
AA	.12	.07	.17	.11	.13	.11	.04	.09
BA			.22*	.12	.30*	.12	.32***	.09
Full-time	.35***	.04	.27***	.04	.05	.04	− .02	.03
Pell	− .10***	.03	− .10***	.03	.01	.02	− .02	.03
Online	.19*	.08	.24***	.05	.18***	.06	.11	.06
Stem	.21	.12	.01	.07	− .13*	.07	− .17**	.06
Hum	.35**	.12	.11	.07	.13*	.06	.06	.06
SS	.26*	.11	.02	.12	− .09	.08	− .17*	.07
Prof	.41***	.11	.22**	.08	.33***	.06	.25***	.06
Predictors of the Difference between Classroom and Online GPA								
	γ_1	s.e.	γ_1	s.e.	γ_1	s.e.	γ_1	s.e.
White	− .12	.06	− .07	.06	− .07	.07	.06	.06
Female	− .03	.03	− .01	.05	.04	.07	.10*	.05
Age	.01	.01	.01	.00	.00	.00	.00	.01
Rem	.13*	.06	.06**	.02	.14***	.05	.15***	.05
AA	− .13	.18	− .12	.12	− .02	.22	− .11	.14
BA			.08	.31	.40	.21	.19	.16
Full-time	− .08	.10	− .04	.08	− .22***	.06	− .06	.07
Pell	− .14***	.03	− .11**	.04	− .07	.04	− .09*	.04
Online	− 1.08***	.13	− .95***	.14	− .92***	.15	− .74***	.17
Stem	.40***	.14	.81***	.15	.57***	.11	.35*	.16
Hum	− .09	.19	.03	.13	− .06	.16	− .18	.10
SS	− .21	.22	.34*	.15	.20	.12	.12	.17
Prof	.20	.18	.30*	.13	.28*	.13	.26*	.12
Intercepts								
F_0	1.16***	.10	1.54***	.12	1.74***	.13	1.95***	.09
F_1	.27	.29	− .05	.21	.14	.17	.11	.25

Note. Rem = Qualified for remedial coursework in Fall 2012; AA = Associate degree program; BA = Bachelor degree program; Online = Online load: online credits attempted relative to total load; Hum = Semester credits in the Humanities; SS = Semester credits in the Social Sciences; Prof = Semester credits professional courses; Stem = Semester credits in the Stem field; ***$p < .001$, **$p < .01$, *$p < .01$.

In brief, the results indicate that conventional predictors of GPA account for the variability in classroom GPA to a significant degree. Female students, older students, and non-minority students tended to have a higher classroom GPAs. Higher classroom GPA was also associated

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with higher academic ability (not needing remedial coursework) and higher socio-economic status. In addition, professional coursework credits and the number of credits in the Humanities had a positive effect on student classroom GPA, possibly reflecting grade inflation in these disciplines. However, these same conventional factors did not appear to fully explain the difference between classroom and online GPA. Our data suggest that net of other factors, academic ability, the number of STEM credits attempted, and online course load represent the most reliable predictors of the difference between GPAs. The gap grows bigger for students who qualified for remedial coursework in their first semester in college and for those with more credits in the STEM disciplines. Interestingly, online course load is not only positively correlated with classroom GPA but it also diminishes the discrepancy between classroom and online GPA. The same was not true for the effect of minority status; the mean classroom GPA of Caucasian students tended to be higher than the mean classroom GPA of minority students, but minority status had no effect on the gap between online and classroom GPA. Nevertheless, in all models, the size and the magnitude of the difference in GPAs reveal that there is a great deal of intra-individual variability in the change from classroom to online GPA. This suggests that other within-person characteristics (not captured by the models evaluated in this study) might be contributing to trends.

Additional analysis on research question 3 indicated that with the exception of the first and the last semester, students with combined coursework were significantly more likely to attain a degree at a later point in time ($p < .001$). Of the 4,914 students who had both online and classroom courses in Spring 13, 31% were able to graduate in a subsequent semester. The proportion of degree completers are presented in Table 1. The odds of degree attainment were about 1.5 times higher for students with a combination of online and traditional courses compared to students with classroom courses only. Interestingly, the odds of degree attainment were about 2 to 3 times lower for the fully online students relative to students with a mix of online and classroom courses.

Significance of the study

Using a large sample from a unified community college system, in four of the seven semesters analyzed we found slightly lower GPAs for students in online courses than for these same students taking classroom courses. These outcomes are interesting for several reasons. First, it is clear that participation in online coursework is a cause for at least some concern for subgroups of students in these community colleges. In general, students' GPAs were slightly lower in their online coursework than in their classroom coursework in the majority of semesters analyzed. These differences were quite small overall. However, students who needed remedial coursework were particularly ill-suited to online study and taking STEM courses online appears to increase the small gaps in GPA between online and classroom conditions.

Second, that for three of the seven semesters there were no significant differences in GPA between online and classroom courses represents an alternate and potentially more positive

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perspective than previous findings (Jaggars & Xu, 2010) and suggest that a great deal of unexplained variance exists with regard to online and classroom academic performance.

Third, unlike previous studies (Xu & Jaggars, 2013) we did not find that minority status or gender amplifies achievement gaps between males and females or minority and non-minority students taking online courses as measured by differences in GPA. Neither gender nor minority status were significant predictors of differences in GPA between classroom and online courses in almost all semesters where difference existed.

Finally, we again confirmed that taking some online coursework appears to be a more efficient means for attaining college credentials. Students who mixed online and classroom coursework were significantly more likely to attain a degree than students who took only classroom coursework. However, taking only online coursework appears to be associated with lower odds of earning a credential. These results extend recent work by James, Swan and Daston (2016), who came to the same conclusion with students in primarily online institutions. Our findings extend this result to students in primarily on-ground (campus-based) institutions as well. These issues clearly deserve further study.

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THE USABILITY EVALUATION OF UNICAMPUS – THE ROMANIAN MOOC

Diana Andone, Vlad Mihaescu, Andrei Ternauciuc,
Politehnica University of Timisoara, Romania

Summary

Society expects from the educational system to provide a new type of worker able to learn independently, online for their entire life – the new open lifelong learning student, but the traditional higher education is not equipped for this. Recently one possible solution was the development of MOOCs (Massive Open Online Courses). While in Europe the MOOCs development is still behind the North American ones, in Romania they are non-existent. Started in 2014 the development of Romanian MOOC – UniCampus – by the Politehnica University of Timisoara is now the final phase. This paper presents the usability evaluation performed over UniCampus with expert and students' evaluation. Based on this evaluation, UniCampus was further developed and enhanced and is now running more courses.

Introduction

Since 2008 (Siemens & Downes, 2008), but predominately since 2011, MOOCs have become one of the major instruments of both innovation and disruption in instruction, especially in higher education. If anything, MOOCs have opened the eyes of many tutors and policy makers, encouraging them to start rethinking how courses are delivered to students.

Some universities professors are using MOOCs in a successful symbiosis with their traditional courses, embracing blended learning or the flipped classroom concept (Bruff, 2013). This has usually occurred when the course developers and tutors of the MOOCs were also the ones who had been teaching the traditional course (Ghadiri et al., 2013). This idea of giving students more opportunities to work collectively is certainly engaging and relates to the new methods of teaching STEM subjects and new approaches to engineering education (Holotescu et al., 2014; Vasiu & Andone, 2014).

The Romanian MOOC

These ideas generated several new developments of online education in Europe, mainly funded by European Union and some implemented successfully (Jansen, 2016)

In Romania learning with ICT or online support have seen a strong development in recent years most universities having their courses on e-learning platforms mainly of Moodle or other open source environments (Vasiu & Andone, 2014), but only after login in with an affiliate student or teacher account. In the same time the Internet penetration in Romania is now up to 65%, the mobile internet use doubled in the last year and its broadband speed situated Romania on top 1-3 in the last 2 years (InternetWorldStats, 2015). In this context access to open and flexible education in Romania as well as a common spread of use of OER is becoming a priority for Romanian education.

Since 2014, the Politehnica University Timişoara had the initiative to create and offer the first Romanian MOOC. The initiative received the name of UniCampus and is intended as an independent platform used by several Romanian universities. Based on previous experience the UNICAMPUS MOOC platform is developed internally by the university team, as a Moodle based LMS and we've argued our choice mentioning Moodle's integration of learning analytics and social media, as well as its familiarity in the Romanian Higher Education. Using an existing platform which already meets the access control and analytics requirements is one way to obtain an effective delivery system for MOOCs. As we have seen, social media is a powerful tool when working with MOOCs, and Moodle integrates most of these recommended tools. With the appropriate configurations and tweaks, and with a minimal integration with some of the most popular social networking platforms in use today, Moodle can successfully play this role. (Ternauciuc & Mihăescu, 2014)

The development of UniCampus

The development phase was based on a research methodology combining the ADDIE model with the Socio-cognitive Engineering concept developed by Mike Sharples. The resulted model (Figure 1) was evaluated by experts and students and the results influenced the Implementation and Deployed System of UniCampus.

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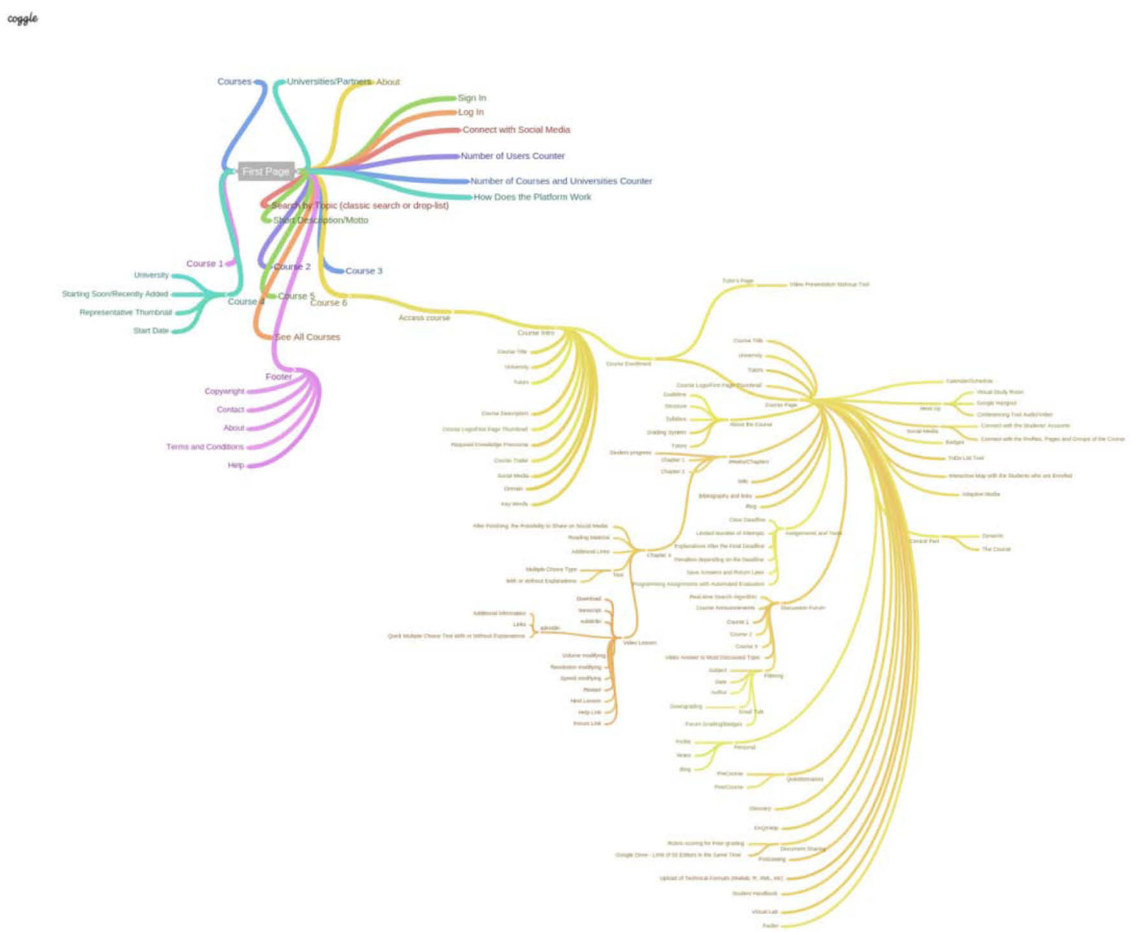

Figure 1. UniCampus structure based on ADDIE

As at this moment the UniCampus is offered only in the Romanian language, we briefly describe the structure. In the upper part of the screen there is a menu containing sections for Courses, About, Universities and Contact as seen in Figure 2 and in the upper right corner the Log in/ Register buttons.

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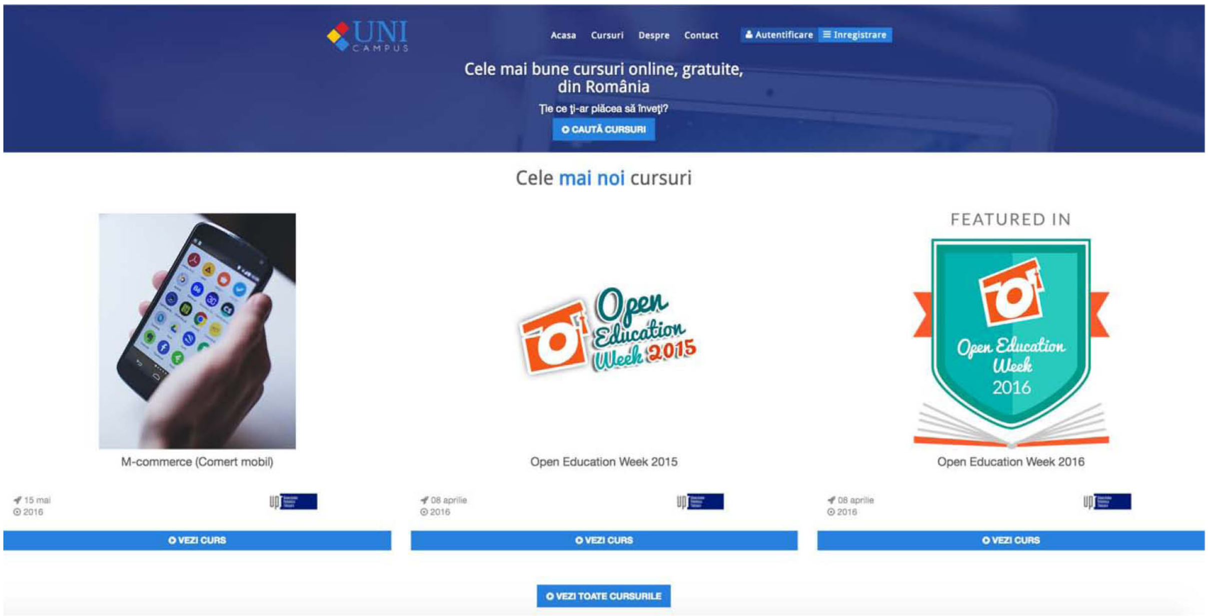

Figure 2. UniCampus online structure

A search through courses option is available and two slide shows can be seen in the middle of the screen, one for partner universities and one for courses. The courses have some important information displayed, such as the title, the university, the starting date and a representative thumbnail. As social media connections are considered important links to Facebook, Twitter, Google+, Pinterest, Flicker and LinkedIn were inserted in the platform. Accessing one of the courses either from the main page or from the courses list sends the user to the *Course Intro Page* where detailed information about the course are presented, like course title, university, tutors, course description, course requirements and course trailer. In this page, the user can see if the course has any fees or any credentials the number of weeks, the number of estimated hours/week and the type of credentials offered after finishing. After carefully analysing this information the student can enrol into the course or share this page on social media.

The platform was built on the Moodle 3.0 version, updated recently on Moodle 3.1. (Moodle, 2016). This version combines popularity with efficiency offering enhanced options for installing plugins, four new quiz question types (Select missing words, Drag and drop into text, Drag and drop onto image, Drag and drop markers), tagging and course editing improvements along with a number of other welcomed features (Figure 3).

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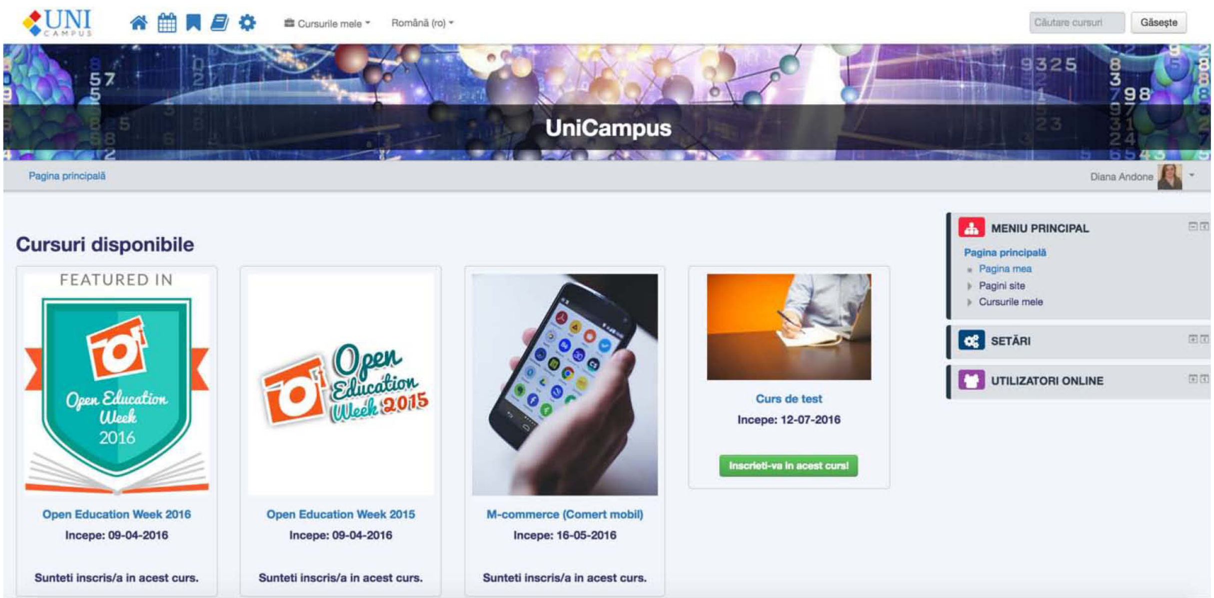

Figure 3. UniCampus Moodle structure

Evaluation of the UniCampus

The UniCampus evaluation was on a pilot course based on educational resources presented during the Open Education Week 2015 event hosted by the Centre for e-Learning (CeL) of the Politehnica University of Timişoara (OEW, 2015). We will refer in this paper to this course as the OEW2015 Demo course.

Fin the first course page, the user is able to see: information about the course (guideline, structure, syllabus, grading system, tutors), the pre-course questionnaire, the different weeks of the course, each in a separate section, the course wiki, bibliography and links, discussion forum (with separate topics for each week), glossary, document sharing, FAQ/Help section, student handbook, to-do list, virtual programming lab, meet up tools (virtual study room and video conference), the final exam and the post-course questionnaire. In the right side of the screen one can have quick access to the to-do list tool, the course completion status, the course calendar, social sharing options, upcoming events and the badges that one has earned. The *SocialShare* plugin allows the presence of a Social Share block, which has the possibility of Facebook like and share buttons, Twitter button, Google+ share button and StumbleUpon share button. This is possible, of course, if the creator of the course allows the content to be public and to be shared on other websites. The *Virtual Programming Lab* module is an activity module that manages programming assignments. It enables the possibility of editing program source codes in the browsers and students could run interactively programs in the browser. One could run tests to review the programs. The module also allows different searches for plagiarism between site files and can put restrictions into pasting external text. For the meet-up tools we have installed and customized the *Video conference* plugin and *WizIQ: A Virtual Classroom* plugin.

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Experts evaluation

The UniCampus evaluation comprises two phase, one is the evaluation of several experts in the fields of education, education technologies and e-Learning, the other is students' evaluation. Both evaluations were performed using questionnaire, the Microsoft usability test and a desirability test (Andone et al., 2009).

The expert's evaluation over the UniCampus demo platform and the OEW 2015 Demo Course (Figure 4) was a very positive one, offering a strong argument for its validity.

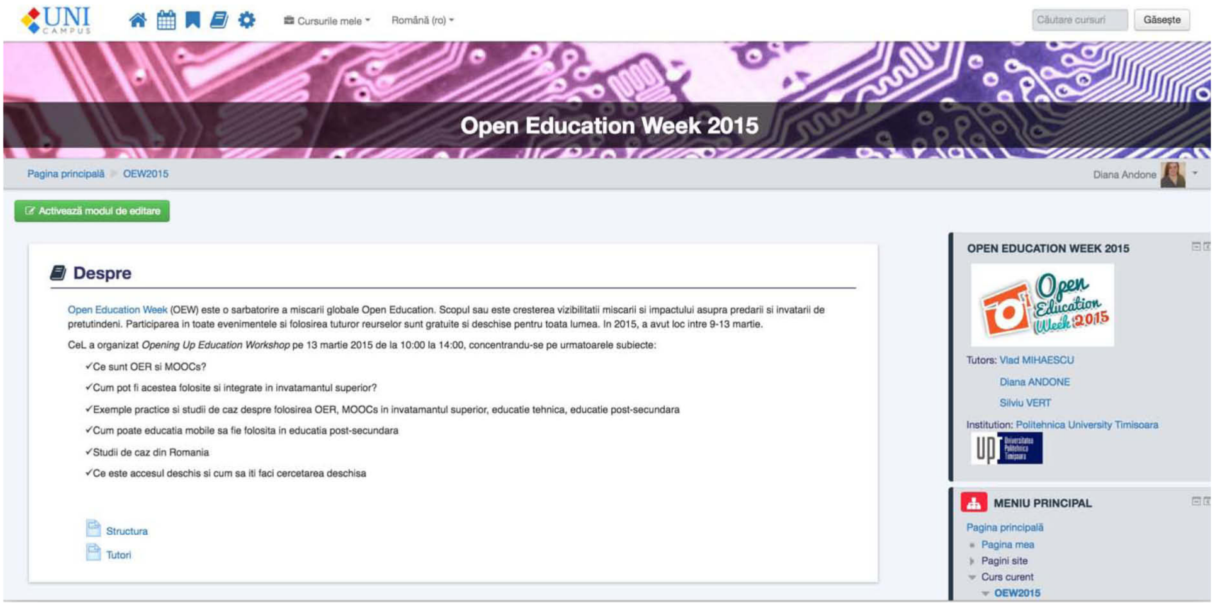

Figure 4. UniCampus OEW 2015 Demo Course

There were, however, several observations into details that the experts considered should be modified for creating a more efficient platform in terms of usability and learnability.

A first observation was a visual one, as some star shaped items integrated from the Moodle theme used, were present in the bottom of each page without having any use or sense. Therefore, these items had to be removed. As it turns out, those visual items were related to marketing aspects of the site, which were later eliminated.

Another annoying aspect was the *About* section description, which was visible in all the week section pages. This section should only be visible in the main course page. Again, this was a particularity default by Moodle, which was solved by modifying coding lines. The experts believe that the forum section should not appear only as a separate section, but should have a chapter dedicated section implemented in each week/chapter of the course and also a quick access module integrated in the right hand side menu of the screen.

The calendar and upcoming events modules are not deemed as extremely important so they should appear in the bottom of the right side menu. The experts agreed on the fact that all modules should have a more compact form and the user should choose which module to fully see. Since this is a demo version, several sections of the course were only present by name,

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without any content or explanation. This was considered wrong by the experts, because even if they understood what everything stood for, when evaluating with students, they could probably have difficulties into understanding. Therefore, proper explanations or sketch pieces of content were introduced in every section or tool.

Regarding the content pages of the course, the experts noticed that the video was visible in a small frame, with a large portion of unused space being visible on the screen (Figure 5). As the content, especially the video one, is the most important in a MOOC course, the experts encouraged to fill the most of the screen possible with the content frame.

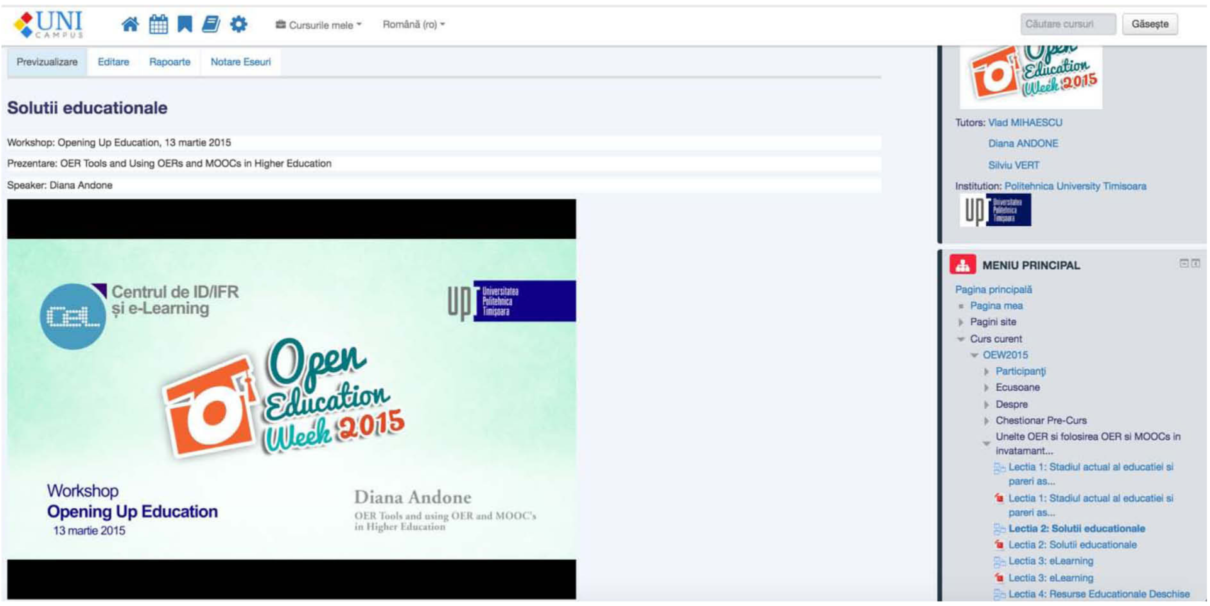

Figure 5. UniCampus Video structure

Students Evaluation

Another important evaluation method was conducting focus groups with students. The purpose was to evaluate the implemented UniCampus platform and the OEW 2015 demo course taking into consideration its usability, learnability, technology and structure (Andone et al., 2009). We organized three separate focus groups with students from the 1st year Master Program of Communication, Public Relations and Digital Media (5 students), the 1st year Master Program of Multimedia Technologies (5 students) and the 4th year Bachelor Program of Multimedia Technologies from the Electronics and Communications Faculty (7 students), each student enrolled in the *Open Education Week 2015* Demo Course. We first asked the students to navigate through the platform and use as many tools as possible, completing the Pre-Course Questionnaire, going through at least one course module and solving at least one quiz, then, we asked specific questions. The first question was to analyse the possibility of connecting to the platform by using ones social media account, a module implemented by myself. All of the students agreed that this is a positive aspect, especially because of its time saving. However, there were some concerns regarding the information that the platform will automatically have access to, from the social media account.

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The following questions were directed to the time availability for completing pre-course and post-course questionnaires. For the pre-course questionnaire, the opinions were equally divided between 5 and 10 minutes, while for the post-course questionnaire, a large majority preferred to give 10 minutes of their time.

Next, we directed the students to the introductory section and asked them to rate from 1 (*not useful*) to 5 (*useful*) the presence of each section. In order of their preferences, the sections received the following scores on average: Guideline (4.6), Syllabus (4.6), About (4.4), Structure (4.3), Tutors (4.1) and Grading System (4).

Then, we asked the students about their opinion regarding the structure of the Week 1 of the demo course. They appreciate it as well designed, accessible and easy to understand. Moreover, the learning content is considered well organized and easy to learn. The presence of the video as a course support material was highly praised. In addition, the students were happy with the lack of technical errors. However, there were some critics as well, the most important being the fact that not all the lessons have buttons for navigating between the week topics.

After the first lesson, we built a quiz with two different types of questions: a multiple-choice question and a mini-essay question. The students think, in a high majority, that the multiple-choice question is friendly. Some believed that it is too easy while others thought that it was difficult, but not posing real problems. On the other hand, the mini-essay question was considered more relevant and difficult because it required the student to think and search for information in order to offer a correct answer. Some believe that this type of question could pose problems, as not everyone is patient to offer longer answers.

We also required the students to indicate how often these quizzes should appear in a course, offering them some choices: during videos, after every lesson, after every week, a few times during the course, only at the end of the course. The majority of the students agreed that the verification should happen either after each lesson or/and after each week. Even if all of the options were chosen, only one student opted for quizzes during videos, some students even claiming that this type of verification distracts the student from the educational content (Figure 6).

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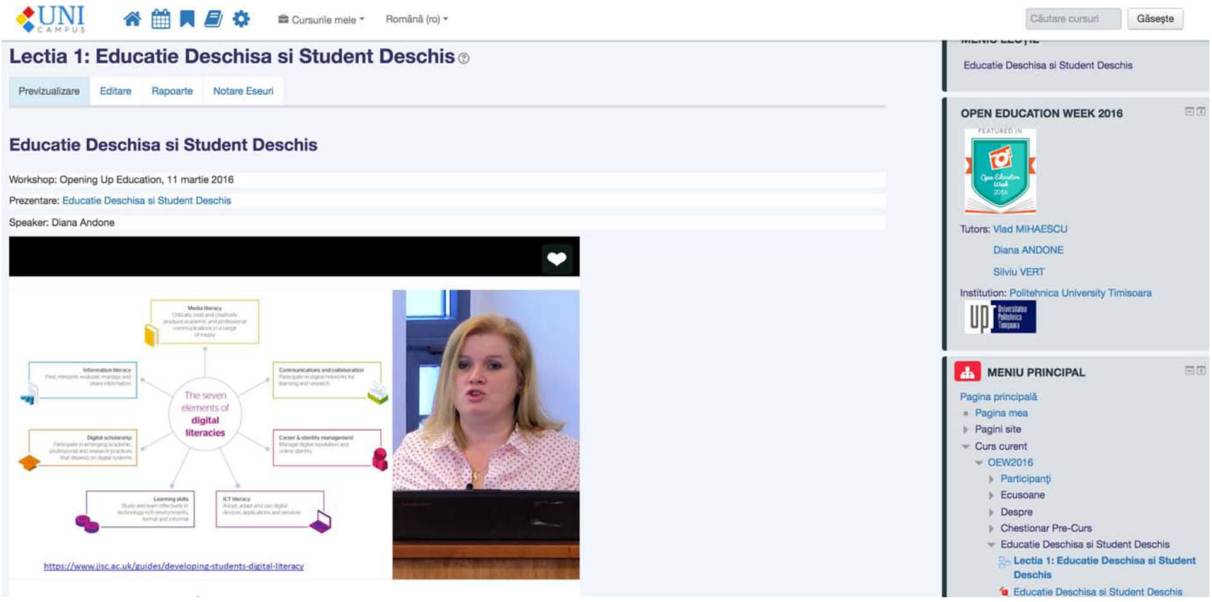

Figure 6. UniCampus video quiz

The final question related to the quiz, was if this type of examination should influence the final score of the student. The opinions were equally divided, with both pros and cons. Some believe the students will pay more attention at every lesson if they have quizzes that influence the final score, while others believe those quizzes should only stand for self-verification.

We asked the students to express their opinions regarding the use of subtitles and transcripts of the video lessons. Almost all of the students appreciate the importance and usefulness of the subtitles offered by the demo course. Their arguments in favour of subtitles are the decrease attention span from our days, the easiness to remember information when it is read, heard and visualized in the same time, or the fact that it helps people who do not know the language of the presentation so well. Some students would prefer a transcript as well and only one preferred the transcript to the subtitle arguing that the subtitle distracts his attention. One of the students could not find the way to activate the subtitle so this should be addressed in the FAQ section.

The students appreciate the presence of navigation buttons in some lessons (previous chapter, next chapter and refresh chapter). They insisted on having such buttons on every page for an easier navigation. Some students proposed design improvements for the buttons indicating a smaller, more discrete button would be better or by stating that rather than the arrow design that I chose, they would prefer buttons with explicit text (e.g. *To the next course*).

Next, we asked the students about their views regarding the *Course Completion Status* section. They agree this is extremely useful and the vast majority prefer that the course automatically checks as completed the activities which they finish. Another argument in the favour of progress checking is the fact that this motivates users and helps them track their evolution.

Another motivational tool is the *Badges* section, where users receive various predetermined virtual ribbons for completing certain tasks. All the students believe this helps them to be

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more motivated and complete more activities. An interesting proposal was of using a system similar to the ones found in gaming, where the "player" receives experience points (XP) for completing certain tasks. After passing predetermined thresholds, the user advances to the next level and receives certain bonuses. It would be interesting for further study to see if and how this system could be integrated in MOOCs.

Distribution of content on social media was the next topic of discussion. All of the students agreed this is a positive aspect and stated they would share certain course topics with others in order to help others learn and easily find information.

Regarding the type of content the students prefer, we asked them to rate in order of preference the following type of content: video, html text, pdf text, ppt, external links or combinations. The only type they all agreed upon was the video, which was rated the first in their preferences. Next, the opinions are equally divided between ppt and pdf type files. The least preferred were the html pages and the external links. The combination that was proposed by some students was video-text content.

The last specific aspects that we required students to rate from 1 (*not useful*) to 5 (*useful*) were the following tools and sections: wiki, bibliography and links, discussion forum, glossary, document sharing, FAQ, student handbook, to do list, virtual programming lab, virtual study room, video conference, calendar, upcoming events and blog. The results were positive as all of these tools received an overall above the average score in usefulness. A detailed view is presented in Figure 7, with an emphasis on at the highest scores were received by the *Bibliography and Links* section together with the *Video Conference* tool. The least appreciated tools were the *To Do List* and the *Calendar*.

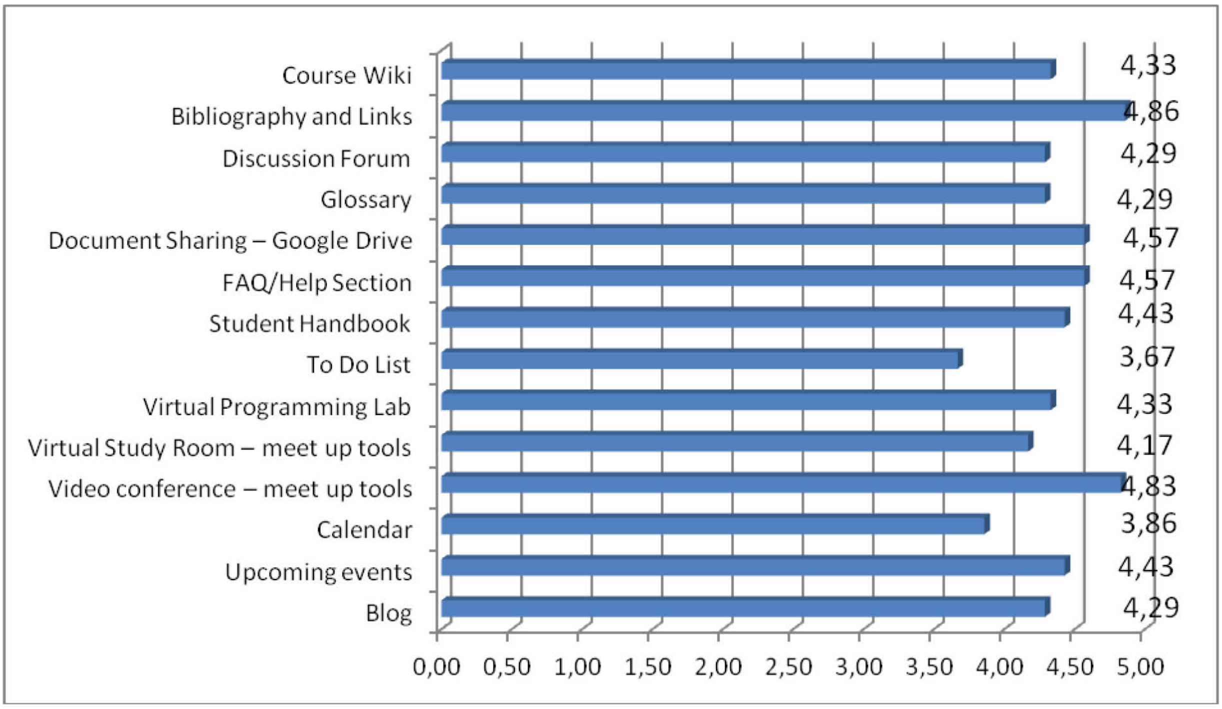

Figure 7. Students Evaluation of UniCampus – tools rating

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The next step into evaluating the platform was using the desirability model (Andone et al., 2009). From an existing list of words that describe usability and interaction, we asked the students to select as many words as they wish, which best describe their overall experience with the UniCampus platform. In order of the most choices, these words are efficient, useful and accessible as seen in Figure 8.

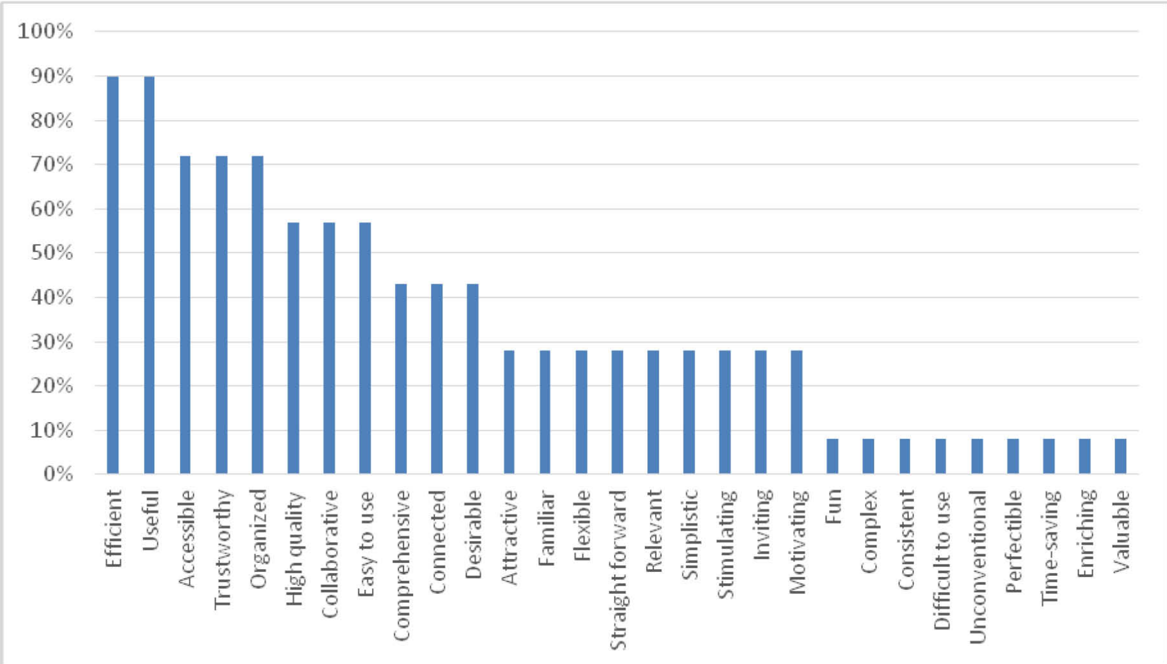

Figure 8. Students Evaluation of UniCampus – desirability

Then, the students were required to choose 5 words best describing their experience with the course video content and then arranging these words from 1 to 5, 1 standing for the word that best describes the item. The most mentioned words were useful, high quality, comprehensive, efficient and trustworthy. Finally, we asked the students to choose again 5 words and rate them from 1 to 5, this time for the tools of the UniCampus platform. The most chose words have been organized, efficient, easy to use, complex and familiar.

Conclusion

Based on this evaluation UniCampus, the Romanian MOOC platform, was further developed and enhanced and is now running one course in Mobile Commerce with three more in the area of information and communication technologies and mechatronics being released in the autumn of 2016.

We consider that in today's world, it can be beneficial for every University professor or student to be involved in the MOOC experience. Offering the best courses by each university, addressed to people who are not regularly attending a university course, it is a great opportunity both to nourish minds but also to promote itself. For Romanian universities, which are public funded, the involvement on the development of a Romanian MOOC Is mainly backed by their belief that valuable knowledge and information need to be made available, freely to the public and into own national language. New methods of teaching and

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instruction need to be used and students need to be fully encouraged to discover and develop skills for online and lifelong learning, also by eliminating the confusion with distance, blended, open education, as we believe this is just 21st century learning.

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CONNECTING IN THE ONLINE ENVIRONMENT: STUDENT PREFERENCES FOR COMMUNICATION WITH FACULTY

Jill Buban, Online Learning Consortium, United States of America

Summary

Whether it be in the online or blended modality, learning and teaching in these formats includes a heightened use of technology. The focus of this paper is a study that examined undergraduate adult students' experiences in academic faculty mentoring relationships that use technology for communication. Through an exploratory mixed methods study, a questionnaire of 273 students and six case studies revealed students' preferences for technology use and their preferences for communication with their faculty mentors. The findings provide insight into how students, faculty, and administrators can begin a conversation about best practices for student-faculty communication in the online environment.

Introduction

Communication between the faculty mentor and student is an important variable related to persistence among learners in both traditional and virtual environments (Stein & Glazer, 2003). A benchmarking study, Best Practices in Adult Learning (Council for Adult and Experiential Learning – CAEL, 1999), found that communication is a top priority in adult learning focused institutions and is instrumental in meeting the needs of adult learners. One-to-one communication, as demonstrated by the academic mentoring model, is crucial to adult learners' successes. This type of communication is evident in student-staff communication, student-faculty communication, and student-peer communication (1999; p.44). In examining undergraduate adult students' experiences using online technology for communication with their faculty mentors, the study explored how factors such as students' age, gender, and culture impacts their preference for a form of technology with which to communicate with a faculty mentor.

Background

A 2008 study (Jones, Johnson-Yale, Millermaier, & Perez, 2008) assessed U.S. college students' Internet use for academic work, and explored how the Internet has affected both their academic and social lives. The researchers' literature review identified advantages of Internet use for student-professor interactions including speed, the ability to record correspondence, and to communicate asynchronously; the disadvantages include misinterpretation of email messages and excessive quantity of email messages, which can be time consuming for faculty and students. Faculty and students disagreed on the preferred communication method. Faculty preferred face-to-face communication while students preferred email. A previous study completed by Jones in 2002 revealed that 46% of students stated that "email allows them to express ideas to professors that they otherwise would not express in person" (As cited by Endres & Tisinger, 2007). In a pilot study conducted in 2012, two emerging adult (18-25 years old) interview participants stated the same feelings in regards to email use. In this study, students were asked their preference for communication with their faculty mentor. In one of six interviews conducted for this study, a 26-37-year-old female expressed the same opinion; that email allowed her to express what she might not say in person. The topic of preference for email communication with a mentor is further discussed in the findings section of this paper.

Dahlstrom et al., (2011) found that 60% of undergraduate students agree that a major benefit of technology is that it makes them feel connected to professors and other college/university staff. The findings from the study that serves as the basis for this paper contribute to the earlier Dahlstrom study in that 50% (n = 3) of interview participants discussed how the use of social media sites such as Facebook and LinkedIn made them feel more connected to their faculty and peers in their classes. Dahlstrom et al. (2011) also offered insight into technologies that students value and want on campus. One student responded that she wished "instructors emailed more so that students and teachers could communicate easier, faster, and more efficiently" (p.17) while 79% of students reported that they use email to communicate with their professors.

Other communication technologies that students would like their instructors to utilize or include are online forums or bulletin boards; online chats, chat events, text messages; and Wikis (p.17). These student preferences for technology use suggest that Faculty mentors and advisors need to discuss communication preferences with their students in order to find a common tool that both are comfortable using to communicate. According to Dahlstrom et al. (2011), the *Millennial* and *Generation X* age groups, prefer and are used to communicating via email, social networking sites, and text messaging, while the baby boom generation (mainly the teachers and mentors) tend to communicate solely via email. Generational differences surrounding technology preferences for communication are discussed further in the findings section of this paper.

Research design

The study was conducted at a public higher education institution that has served adult learners since 1971. The institution began offering distance learning courses 25 years ago as correspondence courses which have since evolved into online courses. Online students account for roughly 50 percent of the institution's enrolment and, while the average student age is 36 (Benke et al., 2012), the availability of online degrees has attracted younger students in more recent years to now include18 year-olds to sexagenarians.

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Phase One of the study consisted of a questionnaire that was adapted from the ECAR National Study of Undergraduate Students and Information Technology Survey that was widely distributed to undergraduate students (n = 2000) while Phase 2 consisted of a multiple case study approach guided in-depth interviews with six students. Each student provided information about the role communication technology played in their experiences with their mentors and their academic mentoring relationship. In both phases, study participants provided information about their ownership of various communication technologies and usage of communication technologies with their faculty mentors and with others (i.e., family, friends).

Findings

Findings from both phases of the study yielded information about the scope of experiences adult online students have using communication technology in their faculty mentoring relationships. Findings show that students prefer more communication with their faculty mentors and parameters for academic mentoring in the virtual world need to be prescribed. A cross-case analysis provided themes that spanned case include: communication patterns, communication preferences, and the mentor experience.

Technology ownership and access

The questionnaire responses revealed that nearly all students own a phone, computer and WiFi access which provides them with access to online education; a type of access that was a barrier to online education as recently as the past decade (Single & Single, 2005). This access provides many working adults the ability to complete their educational goals. These tools not only provide access, but they provide students with the ability to communicate with their mentors in a virtual environment.

The types of technology to which a student has access may also play a role in shaping communications between students and faculty mentors. All (n = 273) respondents indicated they owned a computer; 97% own a phone, 62% own telephone-like applications, and one-third own an iPad/tablet (35%). Most respondents (82.4%) indicated that they have a WiFi connection, an Internet access feature that is typically a barrier to online learning for students in rural areas. Because ownership doesn't necessarily indicate use, information about usage of devices by students with their mentors was collected See Table 1). While phone and computer are used with mentors and friends and family, telephone-like communication is used at a higher percentage with friends and family (See Table 2).

Table 1: Technology used with faculty mentor as categorized by percentage of sample age

Age	Phone	Computer	E-Reader	Telephone-like Communication
18-25 (n = 29)	75.9	100	-	6.9
26-37 (n = 100)	70	98	10	-
38-50 (n = 105)	64.8	97.1	-	6.7
51+ (n = 39)	66.7	94.9	2.6	1.3

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Table 2: Technology used for personal communication as categorized by percentage of sample age

Age	Phone	Computer	E-Reader	Telephone-like Communication
18-25	100	100	-	62.1
26-37	99	93	3	57
38-50	98.1	98.1	5.7	53.3
51+	100	100	-	51.3

As Table 1 and Table 2 demonstrate, emerging adults, or 18-25 year-olds, are the age group that use the phone the most to communicate with faculty members. Phone communication increases with personal communication across all age groups, as does telephone-like communication. Telephone-like communication was analyzed more closely as it provides face-to-face synchronous communication.

Telephone-like communication

Telephone-like communication, such as Skype, is not used as frequently for faculty mentor-student communication as it is with friends and families. Over the course of a 15-week academic term, 18% of respondents report using this technology application nearly once per week (13+ times) while another 17% report using it 1-3 times per term. Over the same time period, there is a much lower rate (4%) of use with mentors (see Table 3).

Table 3: Telephone-like communication use as categorized by frequency percentage

	1-3 Times	4-6 Times	7-9 Times	10-12 times	13+	N/A
Faculty Mentor	4	.7	.4	.7	.4	93.8
Friends & Family	17.2	10.3	3.7	1.8	17.9	49.1

Communication technology preferences

Whether the preference for communication was phone, email, or, on the rare occasion, telephone-like communication, the responses didn‘t support societal stereotypes of the young yearning to use social media and email, as described in the Digital Divide (PBS, 2011), nor did they support the middle-aged or traditional adult learner being unsure of, or afraid of technology use. Contrary to this belief, emerging adults had the highest percentage of questionnaire respondents among all age groups that preferred to use the phone to communicate with their mentors. They were also the only age group that did not rank any social media application in the top five technologies they wished their mentor used to communicate, while the middle- aged and middle-to-late aged respondents preferred to use email to communicate and ranked social media applications in the top five technologies they wished their mentors used to communicate with them. Differences were also found between genders.

With the addition of many social media applications (Facebook, LinkedIn) and other Internet-enabled forms of communication (blogs, social studying sites) to choose from, email (85%) and phone (37%) ranked the highest among 11 technologies and computer applications that could be used for communication purposes. Not only were email and phone the overall

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top choice, they were also the top choices for technologies they wished their mentors used more frequently in their relationship.

Social media applications rounded out the four lowest rankings in terms of usefulness in a mentoring relationship. Respondents from the 18-25-year-old age range are the only respondents who do not rank Facebook and LinkedIn in the top six technologies they would like to use in the mentor relationship while telephone-like communication and contributing to and reading blogs both rank in the top six across all age categories.

Both 18-25 year olds interviewed preferred the phone to communicate. When reviewed by gender, males (n = 2) prefer the phone and 75% of females (n = 3) prefer email to communicate. Both males interviewed are opposed to the use of social media to communicate with their mentors as they find social media applications unprofessional and only appropriate for use in personal relationships. Assumptions about online learning and the services, support and communication methods used in this environment are mentioned by 50% of the interview participants. This assumption spans age groups and includes both males and females.

Gender and social media

A recent study (Duggan & Brenner, 2013) suggests that Twitter is appealing to 18 to 29 year olds (emerging adults), African Americans, and urban residents while Facebook appeals to women and 18 to 29 year olds. Additionally, it describes women as being more likely to use social media sites than men. The study that serves as the basis for this paper supports the Duggan and Brenner (2013) findings in that there is evidence for both African American and female emerging adults' preference for social media. It differs from the study (Duggan & Brenner, 2013) in that the findings didn't show that emerging adults preferred to use social media in mentoring relationships.

The one African American interview participant was introduced to Twitter in a Massive Open Online Course (MOOC) that she took for credit at the institution that served as the site or the study. She enjoyed the ability to connect with others through the use of social media. This is an example of student preference to engage and connect to their peers and instructor in real time; a preference that was evident in the case studies of the females who wanted to use social media in their mentor relationships.

The four females who participated in the interviews saw social media as a possible way to communicate more effectively with their mentors, despite not currently using it in this context. This would enable modes of communicating, increasing the speed of response, and enhancing convenience. In continuing to support the Duggan and Brenner (2013) findings, neither of the two males interviewed thought social media should be used with their mentors. They didn‘t think it was a professional avenue. These findings suggest that females feel connected through communication. Women tend to look for attachment opportunities in their relationships.

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Emerging adult preference for phone communication

One of the surprises in the findings is emerging adults' preference for the phone over such social networking modes as Facebook. Why might this be the case? While all age groups preferred the phone because it enabled them to engage in a two-way conversation, ask questions when needed, and avoid the need to follow a scripted email, 69% of the 18-25 age cohort used the phone—the greatest proportion of any age group. Virtual mentoring that lacks phone communication and that relies only on email and text forms of communication runs the risk of having machine-like characteristics (Scigliano, 2008). While students may not all prefer the phone or Skype for communication, they did not like to receive canned, or scripted emails that were sent to masses of their peers. This dissatisfaction speaks to a desire for more personalized communication, whether via email or phone. Sharing information in a personal manner, as opposed to through the use of mass emails, is a vital relationship-building component of e-mentoring (Scigliano, 2008).

Expedience of phone communication

Other respondents preferred the phone because they felt it was a more expedient way to communicate. Others mentioned that although they would have to set up and wait for a phone appointment, they preferred to do so rather than wait for an email response. The elapsed time allows for one to forget or to move on; for a topic to become less important. Overall, when they wanted to engage in conversation and feel connected to their mentor, students expressed a preference for communicating with their mentors by phone rather than email or forms of electronic communication.

Email preference

Others preferred email to phone because it allowed for a paper trail and didn't require an appointment, as phone calls often times require. The other respondents who supported email preferred the ability to compose their thoughts and proofread an email. By contrast, the —off the cuff nature of email made some uncomfortable. While students take initiative to contact their mentors, communication isn't a one way street. The findings of this study suggest that communication from mentors to students is critical, no matter the form of communication.

Conclusions

The purpose of this exploratory mixed methods study was to better understand undergraduate students' experiences with faculty mentoring relationships that use technology for communication. Key conclusions include: female learners prefer different forms of communication than males, emerging adults prefer to use different technologies than older (26+) students and access to online learning is widespread.

Female learners prefer different forms of communication than males

In support of Belenky et al. (1987), Gilligan (1982) and Ferris (1996), females prefer relationships that build on personal communication, regardless of whether the communication is face-to-face or conveyed through technology. This is also true of online

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communication. While their male counterparts need communication, brief informative conversations, regardless of the technology used are acceptable. The types of communication females prefer support the more relational forms of communication. Female interview participants (n = 4) discussed how social media could be useful in relationships and described social media as a way to connect to their mentors while males (n = 2) thought the use of social media in a mentor relationship would be unprofessional.

Emerging adults prefer to communicate using different technologies than older (26+) students

More emerging adults prefer to communicate using the phone than any other age group (26-37, 38-50, 51+). This conclusion is evident in the findings from both phases of the study. This conclusion is in concert with recent studies (Dahlstrom et al., 2011; Arnett & Schwab, 2012) that found that though students are interested in "hot" new technologies but they rely on more traditional technologies (Dahlstrom et al., 2011) and that emerging adults use social media to communicate more with their friends and family (Arnett & Schwab, 2012). Overall, most emerging adults do not prefer to use social media with their mentors, as evident in this study's questionnaire findings.

Access to online learning is widespread

Most participants (82%) have access to WiFi, meaning they have high speed Internet access and access to online learning. As this number increases, foreign, rural, and military students will gain increased access to education which increases equitable education. In other words, increased access to technology and online learning environments increases access to education and provides opportunities to students who otherwise wouldn't have been able to do so. Online learning is doing for many what adult learning centred institutions did in the 1970s for adults and women.

The study found that emerging adults are the least likely age group to want to use social media with their mentors, while females are more likely to prefer this mode of communication as social media provides the capability to engage in a relationship that mirrors personal discussions. Findings show that students prefer more individualized communication, rather than formal group communication.

In conclusion, as the adult centred institutions of the 1970s provided education to adult learners, online learning environments continue to do so and have expanded to reach a wide array of students who otherwise would not have been able to continue their education in a post-secondary environment. Learning and teaching in these formats includes a heightened use of technologies that provide an array of opportunities for student-faculty mentor communication and should be uniquely considered with varying online student populations.

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CONTEXTUALISING LEARNER EXPERIENCE: USING LEARNING ANALYTICS AND OTHER METHODS

Daphne Chang, Gerald Evans, The Open University, United Kingdom

Abstract

In this workshop/discussion we will demonstrate how we have used a range of tools to measure the student experience on a second level 60 point undergraduate interdisciplinary module that is taught remotely. This module currently has 350 students who are located all over the UK, with a minority based in Europe and the rest of the world.

As with other modules offered by the Open University (OU) in the UK, our students come from a diverse background and learn from printed and VLE materials with help from their tutors, who deliver correspondence tuition and tutorials (a mixture of face to face and online tutorials). The module chair, responsible for the quality of teaching materials, does not have direct contact with the students. In our session, we will outline how, in our capacities as the module chair and TEL designer, we have compiled a comprehensive picture of our student experience, gathered from different stakeholder perspectives and using qualitative and quantitative methods to inform the changes to the module.

This workshop will demonstrate learning analytics alone is not sufficient in understanding learner experience. Different methods (including learning analytics) can help to contextualise learner experience better and hence contribute to student success more effectively.

Overview

As Lockyer et al. (2013) identify, analytics can be used both to inform course design and to offer additional metrics that support educators in making appropriate changes to improve a design. And yet a focus on the perspectives of learners is essential to fully benefit from the lessons learned (Ferguson, 2012) with some arguing learning analytics is not the panacea to solve all complexities of increasing student success (Prinsloo et al, 2012).

This session will explain how we used the learning analytics and other methods to understand the student experience on a second level undergraduate interdisciplinary module comprehensively. We will outline the context of our project, explain the tools we used to measure the student experience from different stakeholders and discuss our findings. Lastly, we will outline the changes we have made to the module and share early findings of these interventions.

The module was launched in October 2012. By October 2014, we had sufficient data to conclude that pass rate and student satisfaction rate on the module were below par, compared to other second level Undergraduate modules within the OU. To understand the issues, we carried out:

- an investigation using a number of Learning Analytics;
- a real-time project to seek student and tutor feedback;
- a mapping exercise to examine student workload throughout the module;
- an examination of student performance by comparing the percentage of students who received low pass/failed marks for the Tutor Marked Assignments (TMAs) of this module with its feeder module and a comparable second level module;
- an investigation to pinpoint when students withdrew from the module.

Students participating in the real-time project indicated difficulty keeping up with workload, which corroborated the student survey carried out in 2012-2014. The workload mapping pinpointed the study weeks for the online collaborative activity as particularly challenging. This mapping could not pinpoint workload for individual students but does provide an estimated anticipated workload for those weeks, for which there is evidence that this is an important factor for student retention (Toetenel & Rientes, 2016). These weeks also require the students to engage with a different type of activity to that which they have engaged with in previous weeks, thus providing a double impact for the students.

Tutors indicated that having 10 calendar days to produce a collaborative output remotely was demanding for the students. It is also high risk as it relied on IT to align the permissions of the sub-forums with those for the synchronous audio tool. A questionnaire designed to survey the tutors' understanding of learner experience helped us to ascertain a different stakeholder's view. This added richness to our understanding of learner experience.

The percentage of the 2013-14 cohort getting fail marks/low passes for this module was higher than its feeder module and a comparable second level module for every TMA, with TMA02 showing the highest percentage. An analysis examining when students withdrew indicated that half did so by mid-December (two weeks after the TMA02 cut-off). Therefore, we identified this as the critical point for intervention.

With the above data, we implemented the following actions for 2015-16:

- The block with the collaborative activity was rewritten to even out workload, streamline the forum structure and ease synchronous discussion. The collaborative activity was timetabled to take place towards the end of the learning unit with a warm-up activity prior to the bulk of the collaborative tasks.
- We redesigned TMA02 so that it contained steps to guide students explicitly on how, for many students, to write the first argument for a second level module.

Although we do not have the evidence to conclude the effectiveness of these interventions yet, so far the evidence is encouraging. Retention for the 2015-16 cohort has improved by 4% in March 2016, compared to the same period for the previous cohort.

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Biography of presenters

Daphne Chang is a staff tutor for the Department of Engineering and Innovation at the Open University. She is a social anthropologist. Her recent work focuses on the use of analytics to improve retention and progression as well as the links between gender and employability for MSc postgraduate students.

Gerald Evans works as a Senior TEL Designer in the Learning and Teaching Solutions department at The Open University, with particular scholarship interests in learning analytics and collaborative activities.

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INVESTIGATING THE EFFECTIVENESS OF THE 'ONLINE LEARNER PROFILING QUESTIONNAIRE' IN GENERATING A PROFILE OF LEARNERS BASED ON LEARNER DISPOSITIONS: A PILOT STUDY

Pengiran Shaiffadzillah Pengiran Omarali, University of Manchester, United Kingdom

Summary

The purpose of this study is to pilot a newly constructed Online Learner Profiling questionnaire (OLP) to address issues of reliability, collinearity and redundancy and to trial its capacity to generate reliable statistical data. The OLP was administered to a sample of Brunei students in the UK and in Brunei to measure their dispositions toward online learning based on the various capital and disposition types drawn from Bourdieu's Theory of Practice as placeholder dimensions. The end objective is to identify key dispositions representing these dimensions in order to effectively perform factor analysis. Through correlation tests and factor analysis, the study identified 6 to 8 discernible factors based on key dispositions which in turn were correlated against key capital that can be inferred as influential to the manifestations of these dispositions. These key capitals and dispositions create different configurations, or Bourdieu's concept of *habitus*, and these habitus is the eventual identifying mechanism for the actual study that will incorporate the finalized version of the OLP questionnaire.

Introduction

In a previous pre-pilot study (Omarali, 2015), it was concluded that the early version of the OLP (henceforth OLP V.1) was not analytically robust to generate discernible groups of online learners, mainly due to (a) the use of a conceptual framework that was guided by a synthetic amalgamation of several learning theories, and (b) the effect of a small sample size on the analytical methods performed. This pilot study builds over the flaws of the pre-piloted OLP V.1 via the process of refining items informed by a less arbitrary framework, yet still retaining the main objective of identifying learners' dispositions towards online learning.

This study has identified Bourdieu's Theory of Practice (1977) as the best fit and most overarching in organizing the items from OLP V.1 because upon attempts to analyze the generated data it was found that the use of several theories, though established as competently reliable in their respective accord, caused disarray when combined together. In addition, Bourdieu's more judicious explanation of dispositions and their interplay were found to be more design practical and content relevant, particularly in refining, omitting and adding items to OLP V.2. The justifications for these processes are discussed in the following two sections concerning *theoretical framework* and *redesigning the instrument*. The preliminary objective of this pilot study is maintained in that it investigates the suitability and efficacy of its design and its choice of items. According to Cohen, Manion, and Morrison (2011) "the wording of questionnaires is of paramount importance and that pre-testing is crucial to their success (…) principally to increase the reliability, validity and practicality of the questionnaire" (p.402). The objective of this pilot is thus mainly to test and judge the appropriateness of the instrument and its individual items in guiding the eventual main research towards its research questions, where findings from this pilot study will allow for refinement (Gillham, 2008; pp.25-31) and the creation of a more robust instrument. Considerations on validity and reliability will be discussed throughout.

Theoretical Framework

The revised OLP (henceforth OLP V.2) has adapted Bourdieu's theory as an encompassing framework that is not only applicable to the items but also explains the interplay between items. Bourdieu's theory revolves around "the interlocking nature of his three main "thinking tools": (…) *habitus, field* and *capital*" (Maton, 2014; p.50). Bourdieu believes that every individual has a portfolio of capital that shapes them notably, socio-economically (economic and social capital), academically (intellectual capital) and culturally (cultural capital) (Crossley, 2014).

More recently, Rojas, Straubhaar, Roychowdhury, and Okur (2004; pp.115-116), realizing that emerging technology is shaping individuals with newfound characteristics and dispositions, expanded the concept further with techno-capital. These capitals exist as *objectified* possessions (e.g. money, computers), as *embodiment* of the learner (e.g. intellect, ICT literacy) and as *symbolic* representations (e.g. support network). The interplay of these capitals result in the learner exhibiting a collection of dispositions called habitus that is embodiment of the learner (Moore, 2014; p.108). Using Bourdieu's (1977) theory of practice as a guiding profiling framework, the items in the OLP V.1 were modified in accordance with the various types of *capitals* and *dispositions* under Bourdieu's theory, as opposed to the use of standalone constructs. Constructs that were previously incorporated in OLP V.1 included digital literacy, digital nativeness, technology acceptance, study habits, learning styles and personality, among others. Grouping these concepts together resulted in the undesirable overlapping of theories as found when a factor analysis was performed on OLP V.1, resulting in items being strongly accountable for several factors. Thus, framing the dispositions based on one complete theoretical model such as Bourdieu's, as opposed to combining several models to achieve completion minimizes the overlapping of items and allows for a clear classification of dispositions and resulting factors. In addition, Bourdieu's theory encompasses all the other predetermined models, thus not deviating from the impetus of the OLP without itself being restricted to predetermined constructs due to its emphasis on inductively investigating *interactions between behaviour* as opposed to deductively investigating *behaviour* per se.

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According to Bourdieu, "power and dominance derive not only from possession of material resources but also possession of cultural and social resources" (Crossley, 2014; p.86). In the field of learning, power and dominance is a learner's ability to function in the learning system. Therefore, possession of resources – whether it is monetary such as having money to spend, objectified such as owning digital devices, social such as receiving family support or cultural such as having been nurtured into a confident learner – can be regarded as *capital* and as such represented as items in the OLP V.2. The possession of these different types of capital in theory influences a learner's disposition towards the online learning system. A collection of dispositions is conceptualized by Bourdieu as *habitus*. As drawn from Bourdieu, "the habitus is (…) both structured by material conditions of existence and generates practices, beliefs, perceptions, feelings and so forth in accordance with its own structure" and in addition "is structured by one's past and present circumstances such as family upbringing and educational experiences" (Maton, 2014; p.50). The relationship between capital and habitus is widely documented in Bourdieu's work and thus the OLP V.2 has dedicated its main sections for *capital* and *dispositions* respectively for its wide applicability to what makes the embodiment or profile of a learner.

In revising the items to relate to Bourdieu's theory, statements representing capital were based on capital types, viz. social capital, techno capital, cultural capital and intellectual capital further extending to sub-types of objectified, embodied, symbolic and intellectualized ownership. Similarly, statements representing dispositions were based on study dispositions and techno dispositions leaning towards student behaviour. The interplay between these capitals and dispositions, represented as items in the OLP V.2 is illustrated in Figure 1.

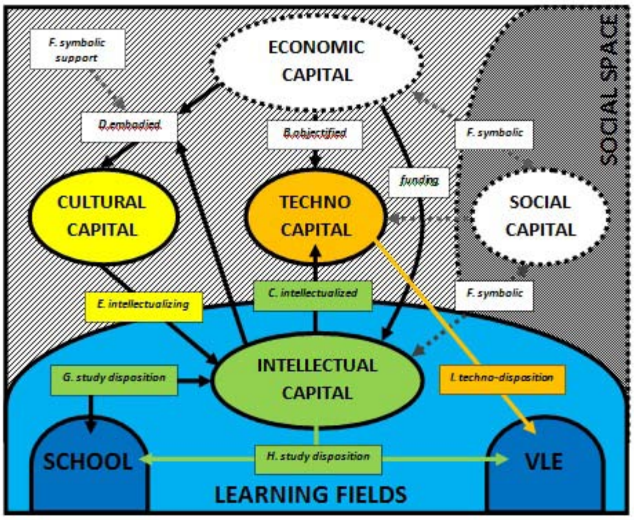

Figure 1. The habitus: The interactions of capitals and dispositions within a learner

Methodology

The questionnaire retained its method of online delivery via Lime Survey due to the practical compatibility of the survey tool with SPSS. The questionnaire was active for 5 weeks within which it managed to collect 126 complete responses and 23 incomplete responses. The

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sampling strategy employed was convenient sampling whereby a link to the survey was distributed to Brunei student societies residing in various countries as well as to the three higher institutions in Brunei viz. Universiti Brunei Darussalam, Institut Teknologi Brunei and Politeknik Brunei; thus targeting undergraduate and postgraduate students who share similar characteristics with the target population of the main study. The pilot considered necessary measures to ensure that the data it generates was protected from threats and thus be valid and reliable. For example, piloting a questionnaire with a larger list of items provided an opportunity to amend the instrument and remove items that exhibit collinearity, as well as ensuring instrument reliability through correlating items to check for internal consistency (Cohen et al., 2011; p.201).

Analysis

According to Cohen et al. (2011; p.402), a pilot study serves two functions and this study attempted to address both. The pilot study involves (a) the analysis on the instrument design to investigate on response rates and types (Kgaile & Morrison, 2006), and (b) the analysis on the generated data to investigate the collective robustness (i.e. reliability, validity and practicality) of the items in generating statistically significant data (Oppenheim, 1992). Findings from both perspectives will ultimately establish the reliability of the questionnaire to be used in the main study.

The approximate population for this pilot given the sampling strategy is roughly N = 4,000, with n = 149 responding to the questionnaire (3.8%). However, what is more important is that the response managed to exceed the minimum n = 100 requirement for factor analysis (MacCallum, Widaman, Zhang, & Hong, 1999) and leaning towards the Rule of 150 minimum requirement (Hutcheson & Sofroniou, 1999). In addition, there is a significant improvement in completion rate as this pilot had 15.4% partial response rate, compared to 42.8% in OLP V.1. The respondent sample has a gender distribution of 76 females (60.3%) and 50 males (39.7%). The mean age is 21.8, with median = 21.0, and range = 19.0 (minimum = 17.0, maximum = 36.0). The academic background ranges from PND n = 3, ND n = 11, HND/AD n = 5, First Degree n = 86, Masters Degree n = 9 and PhD n = 2. On experience with formal online learning, n = 64 have experienced online learning while n = 62 have not. According to Morrison, "an unrepresentative, skewed sample, one that is too small, can easily distort the data, and indeed, in the case of very small samples, prohibit statistical analysis" (1993; cited in Cohen et al, 2011; p.209). In all three demographic profiling, the data indicated acceptable ratio and spread reflecting the general population, albeit with the clear distinction that experience in online learning is attributed to either a student studying in Brunei (hence no online learning) or abroad (hence possible online learning). Overall, the sample was adequate for statistical analysis.

The OLP V.2 data set comprising of 149 responses were imported to SPSS. The extent of completion among the 23 incomplete responses widely varied and therefore these cases were omitted from the actual data set instead of performing multiple and/or fractional imputation

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(Durrant, 2009) to maintain 126 complete responses for further analysis. In order to identify the interplay among the items in the data set, the items as per their respective placeholder sections, were analyzed separately into *demographic* data, *capitals* data and *dispositions* data subsets, with emphasis on identifying via statistical analysis (a) the types of dispositions exhibited in varying extent by all respondents, and (b) the types of capital that associate with the dispositions. Objective (a) will be realized via factor analysis, and objective (b) via correlation tests.

Analysing Dispositions data

The 35 items were correlated against the items that represented the 4 forms of capitals in the OLP V.2, viz. (a) technology ownership, (b) internet/technology skills, (c) personality, and (d) learning skills to establish if these capitals were contributing to the manifestations of the dispositions. Correlation tests involved juxtaposing one set of items representing one of the four capitals, against one set of items representing one of the 8 component factors, thus involving 32 separate correlation tests. The criteria for inclusion is an alpha coefficient of $p = .05$ with value of $r = \leq -.520$ or $\geq .520$ to denote strong correlation. However, none of the capitals established evidence of strong correlation. It is thus alluded at this juncture that the sample exhibit near homogeneity with regards to capital.

The 66 items representing dispositions are sets of manifest variables that determine a yet unclassified set of latent variables. According to Hutcheson and Safroniou (1999; p.218), "exploratory factor analysis identifies relationships among variables which are often far from obvious in the original data". When an initial exploratory factor analysis was attempted, the computation however resulted in a *not positive definite* matrix with rotation failing to converge in 25 iterations. This finding indicated the possible presence of redundant items that were prevalent in the design of OLP V.1 and OLP V.2. Omitting these redundant items will not only improve the case-item ratio favourable for factor analysis but also strengthen the analysis because "variables that do not appear to be related to other variables will not easily form factors and should be removed from the analysis" (Hutcheson & Safroniou, 1999; p.223). In addition to removing weakly correlating items, the finding earlier also indicated the need for data screening processes to ensure that items are not violating the assumptions for a robust factor analysis. Hutcheson and Safroniou underlined tests for normality and outliers (1999, p.222) and as such these procedures were performed prior to performing correlation tests. A Shapiro-Wilk normality test was first performed on the items to establish its distribution and the items were found to be non-normally distributed. Nonetheless, Bishara and Hittner (2014; pp.1-2) found that "in the social sciences, nonnormality is common that it is arguably the norm", expanding further that an analysis by Micceri (1989) on several hundred psychometric and achievement data distributions in education and psychology found that "31% were extremely asymmetric, 29% had more than one peak, and 49% had at least one extremely heavy tail" (Bishara & Hittner, 2014; p.2).

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The method of factor analysis involves the "identification of factors (…) based on correlations between variables {and that} for a good solution, groups of variables need to be correlated" (Hutcheson & Safroniou, 1999; p.233). Therefore, in order for the solution to be robust, it must be determined beforehand that the variables computed into the analysis are indeed correlated. The non-normality of the data posed a problem because factors are determined by Pearson correlation. However, "Pearson's r may inflate Type I error rates and reduce power" (Bishara & Hittner, 2012) and that "Pearson r could be exaggerated by non-normal data {whereby} bias could be as high as +.14, particularly with a Heavy-Tailed distribution for one variable and a small sample size (n = 10)" (Bishara & Hittner, 2014; p.10). In literature, the sensitivity of Pearson's r for non-normal data led to suggestions for either data transformation to restore normality, or the use of other correlation methods. This pilot study has identified Spearman's rho as an alternative method that is less sensitive to non-normal data. It is also less sensitive to outliers compared to Pearson (Abdullah, 1990; Balakrishnan & Lai, 2009) because a few variables tested positive for outliers. Nonetheless, the opted correlation testing was Spearman as most relevant for non-normally distributed ordinal data. Items with 2-tailed statistical significance with moderate correlation coefficient r = > 0.5 were maintained whereas items that were below the coefficient threshold were omitted, resulting in 35 items of recognized correlations. Consequently, a second factor analysis was performed on the 35 items, resulting in a definite positive matrix with a Varimax rotation converging in 12 iterations (see Table 1).

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Table 1: Rotated Component Matrix

	Component							
	1	2	3	4	5	6	7	8
[Strong cultural values due to the support I have] 10. I believe that I have...	.765	.061	.257	-.047	.052	-.007	.432	-.049
[Strong ICT skills due to the support I have] 10. I believe that I have...	.546	.289	.492	.162	.162	-.290	.155	.340
[Relative academic success due to the support I have] 10. I believe that I have...	.657	.329	-.075	.135	.201	-.096	.547	.067
[Reading printed books or notes] 11. I prefer learning through...	*.859*	.173	-.029	.145	-.202	.215	.056	.199
[Watching videos] 11. I prefer learning through...	.032	*.699*	.295	.158	.134	.136	.260	.278
[Watching how others do their work] 11. I prefer learning through...	-.051	.298	.348	.392	.331	-.115	*.625*	-.206
[Browsing the internet for information] 11. I prefer learning through...	.012	.331	.309	.185	*.672*	.205	.323	-.055
[Interactive software] 11. I prefer learning through...	.500	.418	.130	-.091	.189	.083	.056	*.595*
[Online groups] 11. I prefer learning through...	.367	*.531*	.254	.207	.511	-.157	.117	-.021
[E-mail or chats for communication] 11. I prefer learning through...	*.558*	.489	.138	.091	.501	-.127	.244	-.127
[Mobile apps for activities and accessing notes] 11. I prefer learning through...	*.551*	.159	.477	.109	.479	.250	.039	-.048
[Online notes that are readable/ downloadable] 11. I prefer learning through...	*.652*	.208	.381	.109	.220	.265	.165	-.042
[Seek the opinions and advice of others] 12. In my studies, I...	-.100	.223	.064	*.829*	.362	.200	.097	.112
[Follow a strict daily/ weekly schedule] 12. In my studies, I...	*.552*	.519	-.069	.419	-.100	.087	.065	.067
[Firstly plan on how I will do my work] 12. In my studies, I...	.192	*.727*	.202	.099	.086	.110	.258	-.061
[Am always calm and stress-free] 12. In my studies, I...	.381	*.613*	.212	.291	-.153	-.034	-.015	-.211
[Am motivated to learn when using the internet] 12. In my studies, I...	.535	*.606*	-.012	-.134	.277	.119	.131	.050
[I first go to websites that I am most familiar with] 13. When I use the internet, I...	*.808*	.165	.094	.052	.129	.283	-.032	.130
[Never get lost in the large amount of internet information] 13. When I use the internet, I...	.446	*.647*	-.011	.467	.100	-.125	.019	.232
[Skim quickly through information] 13. When I use the internet, I...	*.485*	.355	.365	.089	.434	.179	-.051	.264
[Do multiple things at the same time (multitask)] 13. When I use the internet, I...	.308	.134	.330	.253	.259	*.619*	.376	.032
[Communicate with people easier online] 13. When I use the internet, I...	.140	.119	*.831*	-.084	.222	.232	.098	.102
[Am careful with the truthfulness of information] 13. When I use the internet, I...	*.652*	.374	.306	.045	-.153	.295	.034	.139
[Choose the easiest/ most convenient internet feature] 13. When I use the internet, I...	*.547*	.257	.620	.212	.183	.062	.066	.171
[Become more motivated to do my school work] 13. When I use the internet, I...	*.666*	.455	.162	.372	.237	-.005	.044	.021
[Skip information that I don't like or find boring] 13. When I use the internet, I...	*.731*	.088	.291	.043	.438	.169	.102	.017
[Concentrate better when doing activities online] 13. When I use the internet, I...	*.681*	.218	.307	.075	.395	-.001	.051	.098
[Consulting my teachers] 11. I prefer learning through...	.175	.078	.001	*.918*	-.005	.105	.054	.116
[Group work] 11. I prefer learning through...	.178	.129	.398	*.724*	.004	-.258	.365	.077
[engaging practical or hands-on activities] 11. I prefer learning through...	.343	.246	.128	.184	.038	.301	*.731*	.204
[Work at my own pace] 12. In my studies, I...	.298	*.597*	.138	.055	.159	.460	.028	.248
[Use it continuously throughout the day] 13. When I use the internet, I...	.233	.054	.229	.008	.169	*.835*	-.007	-.041
[Prefer looking at photos and videos] 13. When I use the internet, I...	.244	.208	*.722*	.285	.025	.308	.161	.145
[Expect to quickly find the information I need] 13. When I use the internet, I...	.141	-.075	.045	.057	*.775*	.200	.017	.279
[Sufficient money to spend on what I need] 10. I believe that I have...	.069	-.009	.163	.258	.097	-.022	.023	*.894*

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Examinations on sampling adequacy suggested that the sample was favourable (KMO = .609) and on sphericity with Bartlett's significance index of $p < .001$ respectively verified the statistical reliability of the factor analysis process (see Table 2).

Table 2: KMO and Bartlett's Test (8 Factor Model)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	Bartlett's Test of Sphericity		
	Approx. Chi-Square	Df	Sig.
.609	7804.978	595	.000

Discussion

With regards to the reliability of the OLP V.2 in generating and identifying factors, the study managed to generate from two factor analysis processes, an 8-factor model and a 6-factor model. The reliability of these factor models were validated via KMO's test of sampling adequacy and Bartlett's test of sphericity taking into consideration measures for identifying the characteristics of the dataset including its distribution, outliers, and undertaking procedures to establish internal consistency via correlation tests, thus eliminating redundant items.

Although discussion on the proper taxonomy of the factor models fall within the scope of the eventual main study, it is promising that the items that constitute certain factors share thematic aspects. On the 8 factor model, it was inferred that items of specific factors were describable to respective forms of dispositions that builds upon the placeholder taxonomy based on Bourdieu's theory. These dispositions were dependent on and thus can be thematically categorized into (a) conditioned skills and expertise (automaticity), (b) maintaining control of one's learning, (c) simplifying the learning process, (d) desire to learn together or with assistance, (e) having information at one's fingertips, (f) what the internet expects from the students, (g) learning processes made possible by the learning environment, and (h) dependent on access to technology.

Based on the preceding discussed findings, the pilot study established that there are 35 items representing *dispositions* that have managed to establish a workable 8-factor model. At the same time, this study revealed that a majority of items representing *capital* did not register as significant items of query. Therefore, from the 137 items included in OLP V.2, this pilot study has managed to identify and remove redundant items and consequently truncate the questionnaire to the size of 48 items on capital and dispositions. This further strengthens the reliability of the instrument particularly in factor analysis in terms of subject-to-variable ratio which for this pilot study was identified as 1:3; a minimum requirement for factor analysis. Furthermore, with a nuanced understanding of the taxonomy to be used in the final version of the OLP, these items can be refined and truncated further into sets of items that abide to

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Bourdieu's theory, thus aligning its theoretical foundation in parallel with consequent studies. At this juncture however, the process of profiling learners based on habitus as supported by the analysis is established as more realistic compared to using existing standalone models or a combination of standalone models as attempted in a preceding pilot study (Omarali, 2015).

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WHATSAPP: "GOING WHERE THE CONVERSATION IS"

Cobus van Wyngaard, Jakkie Strachan, Thomas Hülsmann,
University of South Africa, South Africa

Summary

UNISA (University of South Africa), like other big correspondence institutions, tries to make better use of the interactive capabilities of digital technology. Like other distance teaching institutions UNISA found that students did not take to online discussions 'like ducks too the water' (Zemsky & Massey, 2004). On the other hand, we found that some students themselves had started to form WhatsApp groups for peer support. The initiative discussed in this paper was initially meant to support students rather than to do research. Nevertheless, our findings provide some valuable insights in using WhatsApp as compared to the UNISA online discussion forum.

We can confidently conclude that students, for reasons of ownership, immediacy and costs, show a certain preference for WhatsApp. We found that WhatsApp was used not only for organizational purposes but, albeit to a limited extent, was also used to address content related questions. Most importantly we observed a considerable measure of peer support through WhatsApp.

Nevertheless, there are some reasons not to regard WhatsApp as alternative to the threaded conference discussion forum available through the university's LMS. There are limitations to WhatsApp as a platform for facilitated online discussions. However, even where institutions are able to overcome student reluctance to participate in online discussion forums, WhatsApp can contribute significantly to supporting students.

Introduction and research questions

UNISA (University of South Africa), like most mega correspondence institutions, wants to make better use of the affordances of digital technology. This is motivated by the intention to better support students and to ensure that students have the skills required for the modern labour market. In its change towards an online distance education university, UNISA has taken several steps: (a) It introduced myUnisa, a Sakai based LMS, creating an online discussion forum for each UNISA course; (b) it introduced e-tutors to support students; (c) it created the signature course model (Hülsmann & Shabalala, 2016) to explore what it means for UNISA to deliver high enrolment programs fully online.

The paper emerged from an initiative to support students; it was initially not primarily meant as a research paper. It hence can be best described as practitioners' research, being first and foremost meant to improve student support by using WhatsApp, but also to critically reflect on what we found by doing so.

With hindsight, we can reconstruct our research questions as follows:

1. Can WhatsApp be used to support students?
2. How students make use of WhatsApp?

In a concluding section we point out limitations observed in using WhatsApp for student support.

Can WhatsApp be used to support students?

The first question can be answered affirmatively. Some of the reasons for this can be traced to the origin of the very initiative reported here. WhatsApp has been used for student support in the course under consideration (CGM1501, Invitation to Theology) since 2014. However, the data for this paper is drawn from the second semester of 2015. Our interest in using WhatsApp in this course was triggered by the observation that UNISA students themselves had started to form WhatsApp based peer support groups. On the other hand, e-tutors reported that students made little use of the online discussion forums now associated with most UNISA courses. Our hope was that by "going where the conversation is", we could better support students. The lecturer and e-tutor made use of WhatsApp from a computer, which reduced the time needed for typing responses as compared to working from a cell phone.

92% of the South African adult population own a cell phone and 60% own a smartphone, compared with 18% owning a laptop or PC (Kemp, 2016; p.388). 75% of all internet page views in South Africa come from mobile phones (p.393). WhatsApp is the most popular social platform among South Africans (p.395). The large-scale investigation by Montag et al. (2015) indicated that WhatsApp accounts for almost 20% of time spent on smartphones (compared with just under 10% for Facebook). Within the group of UNISA students participating in the course under consideration, 75% already had WhatsApp connected to a cell phone number they provided to the university.

To manage their costs 84% of South African cell phone users opt for prepaid services (Kemp, 2016; p. 398). In a recent study on South African mobile data usage, Mathur et al. (2015) stress that all South African mobile data users, most particularly low-income users, are very conscious of costs. Mobile data costs range from ZAR 2.00 per MB (EUR 0.13) to ZAR 0.14 per MB (EUR 0.01) if a 500MB bundle is bought (Vermeulen, 2015). At least one South African mobile network supplies a WhatsApp bundle which allows for unlimited WhatsApp usage at a cost of ZAR 7.50 (EUR 0.45) per month (https://www.cellc.co.za/cellc/bundles-contract-detail/Whatsapp-Bundles). Should a student wish to access the online discussion forum set up for each course as part of myUnisa, the student would have to navigate through a minimum of five pages to drill down to a particular discussion, without any guarantee that

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new messages have been posted. A single opening of the myUnisa student platform, logging in, and navigating to a single discussion on the e-tutor page consumes almost 1MB of data. Glasswire, a network monitoring tool, was used to track data usage on the myUnisa platform in a single session in which these minimum steps were taken. 860KB of data was consumed by accessing the myUnisa platform and performing these steps.

The South African IT journalism website MyBroadband recently calculated data usage for WhatsApp using the WhatsApp network usage tool. According to this method, sending and receiving a total of 1705 messages over a period of 30 days consumed 14.4MB of data (MyBroadband, 2016). Using the same method, we found that a cell phone which was dedicated exclusively for the use of this course consumed only 14.6MB of data while sending and receiving a total of 1495 message during the course of a semester. So while WhatsApp is widely recognized as a cost saving device when compared to sms's or phone calls, it also can be considered a cost saving device when compared to the online forums. But WhatsApp not only reduces cost but by saving time it increases immediacy, since new messages generated within the WhatsApp group are automatically *pushed* to all the members of the group, rather than requiring students to *pull* (possibly non-existing) information from the course website.

WhatsApp is a technology literally at students' fingertips, which means that they are more conversant with WhatsApp than with computers or laptops. Almost every person in South Africa with a cell phone capable of using WhatsApp is connected to WhatsApp. For these reasons students are likely to have a greater sense of ownership of WhatsApp than of the online discussion forums.

At the beginning of the semester, July 2015, WhatsApp groups were created using the cell phone numbers of students registered for the course. Drawing from past experience of misuse, discussion rules were communicated to students explicitly requesting not to use the WhatsApp group platform for non-course related communication.

Altogether 190 students registered for the course in the second semester of 2015. These students were all added to an e-tutoring page on myUnisa which contained an online discussion forum. 142 of the 190 students could be identified as having cell phone numbers connected to WhatsApp. Since WhatsApp at the time had a group limit of 100, these students were divided into two equal WhatsApp groups. 29 students left the WhatsApp groups during the semester. 14 students actively participated in the online discussion forum and 74 students actively participated in the WhatsApp groups. Note that we do not compare behavior of different groups but usage of different platforms. As mentioned above, all 190 students had access to the online discussion form of the course; among them 142 participated in the WhatsApp groups organized by staff.

Hence, our findings suggest that, for reasons of ownership, competence and costs, students take more easily to using WhatsApp than to using the online discussion forums. WhatsApp can therefore be used for student support; the question remains how students use it, and what kind of student support this would make possible.

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How students make use of WhatsApp?

While we were quite confident that students would take to WhatsApp for the reasons outlined above (including ownership, competence and costs), we were not sure how WhatsApp would and could be used in practice. In order to understand better how students use WhatsApp, we coded the transcripts for the two WhatsApp groups in the following way: Each message was categorized in two categories, Category A and Category B. Category A classified messages as either administrative, content related or social. Category B classified messages as and questions, answers, comments or announcements. Moreover, all messages were marked as either staff messages (which included a lecturer and an e-tutor) or student messages. The message types within the two categories were defined in the following manner:

Table 1: Definitions of message types

Category A	
Administrative	Messages related to organizational or technical issues, including making sure about submission dates or finding material on the online student portal.
Content	Messages related to first or second order reflection on the prescribed material or assignments. Such messages ranged from fairly direct questions ("where do I find a definition for spirituality") to more complex reflections (discussions around the relation between different study units presented in different parts of the material). However, we do generally not observe argumentative sequences (i.e. sequences of arguments and counterarguments leading to a final resolution), but mostly questions which receive direct answers.
Social	Messages not directly related to either administrative or content aspects, but pertaining to the relation between students; for example, the brief "thank you" messages responding to assistance with other questions.
Category B	
Question	A message which contains an explicit request for support, requiring a particular response about some aspect of the course. We exclude from this type staff questions posted to trigger interaction; such messages have been marked as comments.
Answer	A message which directly responds to a question asked.
Announcement	A message which contains formal announcements to the group. Such messages were almost exclusively posted by the lecturer or the e-tutor
Comment	All messages which do not fit into the question, answer or announcement categories were marked as comments.

Since each answer was linked to the preceding question to which it was a response, we were able to trace if the question was asked or answered by staff or students, and which questions remained unanswered. This question-answer structure provides a lens through which we can analyse student and staff interaction. Note that beyond marking a message as mainly belonging to one of the three message types in Category A (administrative, content, social), we do not analyse the actual discourse. Using the above categories, the Table 2 presents the message and word count for the use of WhatsApp (integrating the two WhatsApp groups into one).

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Table 2: Message counts (M) and word counts (W) in WhatsApp conversations

		Total	Questions		Answers		Comments		Announcements	
			Staff	Students	Staff	Students	Staff	Students	Staff	Students
Social	M	388	0	3	0	4	6	375	0	0
	W	3050	0	40	0	16	33	2961	0	0
Admin	M	351	0	78	35	54	21	127	33	3
	W	7033	0	1660	943	747	675	1573	1384	51
Content	M	287	0	62	44	46	36	87	11	1
	W	10078	0	1523	2129	1031	2233	2312	804	46

Social messages constitute 38% of all messages, but only 15% of all words. The average length of a social message is 8 words. As mentioned above, students were actively discouraged from posting anything not directly course related. Yet in spite of this, students found ways of connecting socially. Messages of this type were mostly expressions of common courtesy such as thanking for assistance, particularly for helping in answering questions. Robinson et al. make use of a complex set of social indicators when analysing the conversation in a WhatsApp group of undergraduate students (Robinson et al., 2015; p.282). While many of such markers were also found in our WhatsApp conversations, the primary marker for social engagement consisted of expressions common courtesy (i.e. "thank you"). While there are slight variations between the two groups, they reveal a similar composition of message types.

Given that messages are generally *thumbed in* on the mobile phone and the WhatsApp communication space is not threaded, the expectation was that WhatsApp would be limited to organizational and administrative use. It is worth at this point underlining the importance of responsively dealing with administrative and organizational issues in distance education. While educators may attribute more importance to content, from the vantage point of the student seem crucial. The immediacy with which WhatsApp is able to address organizational ad administrative issues suggest that it can play a significant role in supporting students.

While the table shows that there was indeed a high number of administrative messages, it also shows a sizable number of content related messages. In fact, messages related to content issues are on average longer (35 words) than messages related to administrative aspects of the course (20 words), reflected in the higher word count under Content as compared to Admin (10,078 to 7033). As expected, WhatsApp can be used for supporting students in administrative and organizational matters; but somewhat contrary to our expectations WhatsApp can also be used to some extent to support students in content related matters.

As Table 2 indicates, all the questions were asked by students. In terms of number of messages, 14% were marked as questions (143 out of 1026); in terms of number of words;16% were marked as questions (3223 out of 20,161).18% of the messages (183 out of 1026) and 24% of the words (4866 out of 20,161) were direct answers (excluding further follow up comments on the answers). This question/answer structure therefore accounts for a large part of the messages and words.

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More important than the finding that WhatsApp can be used to address for dealing with content related issues is the way it lends itself to peer support. Table 3 compares the message use in the discussion forum and WhatsApp. Students post far more messages in the WhatsApp groups than in the online discussion forum. Most importantly, while no students answered any question using the online discussion forum in WhatsApp, they not only answered questions (including peer questions) but did that even more than the staff members involved.

Table 3: Message count of questions and answers

	# Questions	Staff answers	Student answers	Unanswered
		In the online discussion forum		
Admin	3	3	0	0
Content	12	10	0	2
		In WhatsApp		
Admin	78	30	37	18
Content	63	30	42	2

Table 4 summarises the uses of the two platforms, WhatsApp and the online discussion forum, focussing on the question-answer interactions, and specifically student questions and peer responses.

Table 4: Summary of participations and question-answer engagements

	Staff words	Student words	Students participating	Student questions	Staff answers	Student answers
WhatsApp	8201	11952	74	138	60	79
Online discussion forum	8224	4464	14	15	13	0

While using the same number of words typed by staff on both platforms, WhatsApp generated almost three times the number of words from the participation of five times the number of students. On the WhatsApp platform seven times the number of direct questions was asked by students. But while none of these questions were answered by peers on the online discussion forum, on WhatsApp groups almost 60% of student questions were directly responded to by fellow students.

The WhatsApp groups therefore led a greater number of students to actively participate; they asked more questions, and also responded to the questions of fellow students, providing for a much greater amount of peer support than on the online discussion forum.

Conclusions and limitations

Hence, our findings confirm that one can effectively use WhatsApp to support students. We can even, somewhat contrary to our initial expectations, use WhatsApp to support content related discussions. In fact, one could push the boundaries in this respect further by suggesting that students use WhatsApp from a computer/laptop rather than from their mobile

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phones, since this makes it easier to compose lengthier messages for more complex arguments. However, doing so is likely to come with significant trade-offs in terms of immediacy and – WhatsApp still being unthreaded – in terms of comprehensiveness, both much appreciated by students.

More significant than the potential for WhatsApp to support content related discussion, seems to us the potential of WhatsApp for peer support. Peer support is increasingly seen as an option to *wriggle out* of the contradiction between scale economies and the responsive interaction at a distance (Hülsmann, 2014; Daniel et al., 2009). Peer support allows making better use of the interactive capabilities of digital technology while steering clear off the cost implications associated with student-teacher interaction.

Our findings indicate that students in this course made little use of the online discussion forum. This is in line with the literature, which suggests that students do not take to online discussion as ducks to the water (Zemsky & Massey, 2004); on the contrary, the literature documents a considerable reluctance on the side of students to participate in online discussion (Ke, 2010; Liyanagunawardena et al., 2014; Hülsmann & Shabalala, 2016). While in theory the threaded nature of online discussion lends itself better to a *virtual seminar* type of online learning, institutions need to overcome this reluctance in order to effectively exploit the full potential of online learning. Without "the ducks coming to the water" the competitive advantage of threading in online discussion forums cannot be realized. Whatever the comprehensive and convincing solutions to this problem may be, our findings suggest that WhatsApp can be used effectively to support students and to elicit a considerable degree of peer support.

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A STUDY OF THE USE OF UBIQUITOUS MOBILE DIGITAL DEVICES IN INTERCONTINENTAL DISTANCE EDUCATION

Maria Luisa Sevillano García, Genoveva Leví Orta, Eduardo Ramos Méndez,
Universidad Nacional de Educación a Distancia (UNED), Spain

Summary

At today's universities, students' use of mobile digital devices is all-pervasive, and this benefits the development of a ubiquitous context for teaching, learning and social interaction. This study analyses how university students use their mobile phones and laptops to do academic work in various places both inside and outside the university compound. We surveyed 875 European and Latin American university students from 13 institutions. The research methodology was developed by factor analysis and comparing groups using parametric and non-parametric testing. The results show that students mainly use their digital mobile devices on campus, for example in the café, faculty corridors, the library or the lecture hall. To a lesser degree, students use their mobile devices for course work off-campus, on public transport, in entertainment spaces, at home, at work or generally outside.

A new situation in university learning

The reform of universities generated by the implementation of courses structured according to the Bologna Process has resulted in a new, even revolutionary, situation. Mobile devices have transformed the notion of a fixed educational setting meaning that the educational process can now take place anywhere: in the city, on a motorway, in a restaurant, in any local or international setting. On 13 January 2012, the El Mundo newspaper published an article entitled A University Model for the 21st Century, which read: "We must start deploying technological platforms that enable teachers and students around the world to interact in real time, so that time and distance are no longer an obstacle, and that everybody, regardless of work schedule or location, can become recipients of the new knowledge provided by universities. We must establish low-cost platforms that enable all the wisdom and knowledge acquired by our best teachers to be privately commercialized across the world." The evolution of mobile devices has been rapid and universal, hardly allowing time for reflection on how to systematically integrate them into the educational system for teaching and learning purposes. These resources have multiple applications and open up numerous possibilities for education, as well as being useful social inclusion tools for people with special needs.

We can characterize the transformational processes currently in motion as a change towards a new collaborative, connective and heterarchical learning paradigm. This important paradigm shift requires some profound changes. From the student viewpoint, the key factors in this innovation in education will be the need to acquire new competences, and to accept the notion of mobility in a higher education setting that is now worldwide and unfettered by frontiers. Teachers will see a redefinition of the balance between teaching, learning and research towards the development of innovation and competences. Learning will be reoriented towards the paradigms of collaboration, reflection and interaction.

Academic experts and professionals believe that continuous innovation is the paradigm that most accurately describes the changes that must take place in higher education. Universities must prepare students for a digital future that is already here; technology now enables us to be in different places at the same time. The concept of ubiquity amounts to a deep technological convergence between all types of media, and the coexistence of the real and the virtual; the availability of information at any time, from anywhere via any kind of device. This type of interaction between numerous devices and social media modifies how we experience the world and how we instruct students. The dimensions of ubiquitous learning seem to be continuity in time and contextual interrelationship, which both help to close the time-space divide. There is a revolution taking place in the processes, content, agents, resources and spaces dedicated to teaching and learning. Aspects of this new learning include exploration, discussion, argumentation, collaboration and reflection (Vázquez Cano & Sevillano García, 2015).

Analyses of the ubiquity and deployment of digital mobile devices have mainly centred on the educational use and didactic potential of such devices (Wu et al., 2012; Ahmed, & Parsons, 2013; Cochrane, 2014; Ciampa, 2014; Furió et al., 2014; Ogata et al., 2014; Keengwe, 2015, among others). Likewise, reports published by technological companies have focused on the analysis of patterns of device usage according to variables such as the age and gender of the users, the number and type of apps installed and used, frequency of use and connection time schedules, and the amount of time spent online etc., (UNESCO, 2013; GSMA, 2014).

The implications of the analysis of the locations where university students use their mobile digital devices for study are enormous in terms of understanding the new patterns of usage of such devices for learning; it would enable us to modify and adapt the technological and spatial infrastructure on university campuses, strengthen study group interactivity models, introduce content that is relevant to the location and needs of the students, adapt the format of educational content to the range of devices used and, definitively, provide a better technological response in terms of content and social potential for students who use mobile digital devices as just one more resource for studying and social interaction from various locations. So, the aim of this research is to analyse the spaces and locations where European, mainly Spanish, and Latin American university students use their digital devices for studying, and pinpoint possible differences between patterns and places of usage in these two Hispanic geographical entities.

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Ubiquitous learning represents a new educational paradigm made possible thanks mainly to new digital media. Any proposal for ubiquitous learning using mobile tools must consider the three pillars of Information, Communication and Knowledge, related to which are five basic micro-competences: searching, communicating, organizing, producing and disseminating. Ubiquitous education focuses on how to optimize the use of the huge amount of information within everyone's reach, and how to access it anywhere and anytime. The most amazing thing is that students can now study and learn in any situation or context. Some authors hold that virtual tools enable everyone to produce and disseminate information, hence learning can be done at any moment and in any location (Sevillano García & Vázquez Cano, 2015).

The scientific design of the study

Objectives

1. To know, identify and assess the uses, frequency of use, benefits and drawbacks that laptop computers and mobile digital phones represent for students in terms of their potential for ubiquitous mobile university learning.
1. Identify trends among university students who use mobile phones and laptops for learning.

Sample

We conducted an intercontinental survey of 875 university students, distributed as follows:

Table 1:

University	Country	Number of students
Complutense	Spain	26
Vigo	Spain	46
Oviedo	Spain	169
Granada	Spain	77
UNED	Spain	108
Otto-Friedrich-Universität Bamberg, Bamberg	Germany	24
Freie Universität Bozen Brixen	Italy	31
Universidad del Libertador Bernardo O´Higgins, Santiago de Chile	Chile	98
Universidad Nacional Hermilio Valdizán, Huánuco.	Peru	52
Universidad de Cartagena, Fundación Universitaria Tecnológico de Comfenalco	Colombia	110
Universidad Pública de Panamá	Panama	29
Universidad Veracruzana, Xalapa	Mexico	105

Instruments

A questionnaire was designed and validated by a group of experts that included open and closed questions, and whose consistency according to Cronbach's Alpha was measured at .920. The survey was then applied by teachers at the various universities. The research methodology was developed using factor analysis and intergroup comparisons by parametric and non-parametric testing. In terms of the four grades *Never, Hardly Ever, Often and Always*, after analysing all the answers and their frequencies, we decided that the *Often* responses were

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the most representative and which best reflected the trend. A contingency analysis of the functions attributed and obtained from the two tools used completed this relation, and enabled us to identify with certainty the trends outlined in the countries studied.

Results and interpretation

Exploratory questions

Table 2: How do you connect to the Internet?

	Laptop	Mobile phone
Spain	14.5	20.4
Italy	33.3	42.9
Germany	21.1	42.1
Chile	13.2	8.8
Peru	19.5	15.4
Colombia	23.9	20.8
Panama	15.4	17.9
Mexico	21.2	19.0

Table 3: Does the cost of connection impede Internet use?

	Laptop	Mobile phone
Spain	6.2	67.0
Italy	3.1	56.0
Germany	2.2	44.0
Chile	7.4	40.7
Peru	18.2	45.5
Colombia	5.7	43.0
Panama	6.7	40.0
Mexico	12.5	70.0

The trend is homogenous except in the case of Chile, where both devices register low usage. Italy has the highest usage in both categories. *Internet connection allows me to search all kinds of sources to quote them in my articles, and to resolve doubts or problems* (Protocol 8). In the contingency table, the *Always* variable figures most prominently for mobile phone use in Chile, at 78%, and in Panama, with 71.4%. For the laptop, *Always* figures highly for all countries, and higher than mobile phone use, with Peru the lowest at 48.8%.

As we can observe, connection costs are an important factor in Peru. In Europe, the cost is not so important for laptops but it is significant for mobile phones, especially in Spain.

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Devices for academic use

Table 4: Use of devices for academic work

	Laptop	Mobile phone
Spain	21.3	7.1
Italy	36.8	3.3
Germany	11.1	1.4
Chile	15.3	5.1
Peru	10.5	18.4
Colombia	21.5	11.9
Panama	14.3.	4.2
Mexico	21.4	6.1

Table 5: Use of devices for studying

	Laptop	Mobile phone
Spain	30.2	15.9
Italy	31.6	21.4
Germany	33.3	11.8
Chile	27.1	17.3
Peru	23.1	14.3
Colombia	36.1	22.1
Panama	28.6	21.1
Mexico	38.2	18.2

The laptop is more widely used for academic work. *During class time I use my laptop for practical tasks and exercises for course work* (protocol 341). Italy scores highest with 36.8%. Mobile phone use for academic work is scarce, except in Peru and Colombia where it registers *Often*. Panama stands out with 82.1% for *Always*, and all countries have a similarly high register in this category. Italy is the lowest at 57.9%. With mobile phones, *Always* figures less than for laptops. Spain scores lowest, at 0.04%, and this is related to high connection costs.

Colombia, Italy and Panama are the countries whose students most often use the mobile phone for studying, but with scores that are always below those for laptops, which is *often* used for studying, registering high scores among all those polled, particularly in Mexico, with 38.2%. *When I do my course work, I use the notes and material given out in class and which I have on my laptop and sometimes on my mobile phone, which I often add to by searching for information on Internet in case I have doubts* (Protocol 62). It is significant that German students register 66.6% in *Always* for laptop use when studying. These data give us a frequency of use of between *Often* and *Always* of 100%. *I use my laptop at home to find information that I might need for projects in class, to copy up my notes that I used to write by hand in class until this year* (Protocol 199).

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Table 6: Searching for academic information

	Laptop	Mobile phone
Spain	34.3	6.9
Italy	38.9	8.3
Germany	23.5	11.8
Chile	28.2	18.5
Peru	25.0	25.7
Colombia	28.3	33.8
Panama	36.0	20.0
Mexico	33.3	21.7

Table 7: Swapping class notes

	Laptop	Mobile phone
Spain	32.7	4.7
Italy	31.6	6.5
Germany	17.6	5.9
Chile	37.8	13.8
Peru	15.4	23.7
Colombia	26.5	18.4
Panama	8.3	27.3
Mexico	28.7	11.2

Table 8: Carrying out group tasks

	Laptop	Mobile phone
Spain	17.9	1.5
Italy	50.0	3.0
Germany	27.8	2.1
Chile	21.3	3.0
Peru	13.5	8.1
Colombia	19.0	9.0
Panama	16.7	18.2
Mexico	23.8	5.4

Searching for academic information refers to enquiries about grants, qualifications, exam results and course notes, and students frequently use their laptops or mobile phones for this task. *When doing course work, I often use my mobile phone to compile data quickly, because it is fast, and I also use my apps in these tasks too* (Protocol 92). Italy, with 38.9, and Spain with 34.3, score highest in laptop use for academic information searches, while students in Colombia and Peru, at 33.8 and 25.7 respectively, prefer using their mobile phones for such tasks. Chile, at 52.4 and Colombia, with 40.6, registered *Always* as the majority choice for mobile phone use in this section, and also scored high for laptop use when carrying out academic information searches. *Never* or *Hardly Ever* scored very highly in all countries for mobile phone use in academic searches, except in Germany (11.8) for mobile and laptop, and for mobiles in Peru (47.3), Italy (42.8) and Spain (35.5).

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The laptop was most frequently used for swapping class notes in Chile, Spain and Italy. In contrast, mobile phones were used for the same task to a significant degree in Panama, 27.3, more than the laptop, at 8.3. *When I get home, I use my laptop as it is more comfortable than my mobile, and I can do tasks and read better on it when I need to look for information* (Protocol 146). *Never* or *Hardly Ever* figure highly in all countries, particularly in Peru, with 45.9 in both categories, and Spain, 43.5. *I use my mobile phone to arrange to meet my class mates to do work together and to swap notes* (Protocol 80). *My laptop allows me to move around from one place to another, collect class notes from colleagues and do group work together instead of being stuck in one single place. I use it to read the press, and copy up class notes posted on the university website, the virtual campus* (Protocol 3).

Mobile phone use for swapping notes scores significantly higher in Panama, 27.3, than for the laptop, 8.3. *I use my mobile phone to read class notes and swap with my colleagues, or I get them from my teacher. I use it for any emergency that I might have, related to university work. I always have it switched on and although I put it on silence I am always aware in case something occurs regarding university work* (Protocol 100). Likewise in Peru, at 23.7 for mobile phone use and 15.4 for the laptop. *Always* for laptop use scores highest in Chile, 42.7, and Colombia, 39.2. *Never* or *Hardly Ever* for notes-swapping via mobile phones is very high in Germany, 94.1, Italy, 92.3 and Spain, 83.3. Perhaps competitiveness among students leads many to avoid swapping notes with fellow classmates.

Working in collaboration with other students has become an enriching and socializing dimension of academic work in recent times, but this is not reflected in laptop or mobile phone use for such tasks. The only exceptions are Italy, 50.0, and Germany 27.8.

Question 19 of the questionnaire was a closed question which asked students about the uses and functions of their mobile phones (results shown in the following table). The communication function followed by use of mobile phone for entertainment, at 629 and 566 absolute impacts respectively, score the highest across all countries. It is the education function, with 155 impacts, that scores the lowest in all countries.

Table 9:

Mobile phone functions	Spain	Italy	Colombia	Panama	Germany	Peru	Mexico	Chile
1. Entertainment	17.2%	27.3%	16.4%	20.0%	18.6%	18.6%	16.5%	17.8%
2. Expression	12.5%	9.1%	11.9%	12.2%	9.3%	12.2%	12.9%	10.2%
3. Motivation	7.2%	4.5%	9.4%	9.6%	.0%	8.3%	7.4%	6.8%
4. Information	13.5%	13.6%	11.0%	8.7%	9.3%	11.5%	12.5%	13.1%
5. Education	4.3%	.0%	6.7%	4.3%	2.3%	8.3%	3.2%	5.6%
6. Collaboration	7.6%	9.1%	9.6%	9.6%	14.0%	8.3%	8.9%	7.8%
7. Communication	20.2%	36.4%	15.3%	14.8%	39.5%	17.9%	19.0%	19.5%
8. Illustration	7.3%	.0%	7.8%	10.4%	.0%	4.5%	6.6%	7.1%
9. Innovation	10.3%	.0%	11.9%	10.4%	7.0%	10.3%	13.1%	12.2%

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Question 19 of the questionnaire was also a closed question which asked students about their personal usage habits and functions of their laptops, and the results are shown in the table below. The highest scores were for the information function, closely linked to education, with 647 out of a possible 875, followed by education at 535. These two functions scored highly across all nations, the total being 4121 impacts over 3255 for mobile phones.

Table 10:

Laptop functions	Spain	Italy	Colombia	Panama	Germany	Peru	Mexico	Chile
1. Entertainment	12.6%	11.8%	10.5%	6.4%	11.3%	8.6%	10.4%	13.1%
2. Expression	9.1%	4.4%	9.4%	5.7%	4.1%	11.4%	8.0%	7.4%
3. Motivation	8.2%	2.9%	8.7%	5.0%	3.1%	7.9%	7.1%	7.2%
4. Information	15.4%	25.0%	15.8%	17.7%	17.5%	17.1%	15.6%	14.2%
5. Education	12.6%	16.2%	13.9%	17.0%	18.6%	10.7%	11.7%	13.1%
6. Collaboration	10.9%	13.2%	10.9%	12.8%	14.4%	11.4%	12.0%	11.4%
7. Communication	12.9%	14.7%	12.1%	11.3%	14.4%	12.1%	13.6%	13.1%
8. Illustration	10.7%	7.4%	9.5%	15.6%	11.3%	10.0%	11.7%	10.8%
9. Innovation	7.7%	4.4%	9.2%	8.5%	5.2%	10.7%	9.9%	9.5%

Discussion and conclusions

This designed, implemented and verified research work represents an innovation that is of social, family, academic, methodological and didactic interest. The results show that the trend is more or less homogenous in all the countries surveyed, with some variations. These include economic factors, which are significant in Peru, which often makes it difficult to use the mobile phone to connect to the Internet due to relatively steep online connection costs. Other cases include Spain, where prolonged journeys on public transport means that students can use their mobile phones to do academic work, among other things. Columbia is paradigmatic in that students often use corridor spaces at the faculty to connect to Internet and do course work, either by laptop or mobile phone.

Empirical evidence shows that there is a duality between competences seen as necessary and which are later put into practice. We find new digital natives who understand intuitively how to operate these devices and who later, with time and practice, go on to acquire and apply such skills.

The results reveal that there are three important tasks ahead: first, telecoms companies should help close the digital divide and promote the teaching and learning functions of the modern ubiquitous mobile technologies by lowering online connection costs for students, especially in those countries where such technologies are virtually the only tools available for accessing knowledge as books are costly and in short supply. The leap forward into the digital universe has been made but full access is still limited due to the high costs of connection, usage and maintenance. Another drawback is low battery life; technology needs to develop longer-lasting batteries to increase autonomy.

Secondly, the growing and increasingly frequent use of mobile connected devices by students requires university teachers to post more curricular content on the faculty networks, not just course information. Although the online swapping of course notes and collaborative works is

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useful and frequently done by students, it would be equally useful to provide more instruction about the availability of digital resources that cover other areas of knowledge, so that students can access such data from their mobile phones. In this new digital age, we cannot have vast repositories of knowledge lying dormant for lack of knowledge of their existence, or the time, training and professional interest to make them known. For example, the Erasmus organization, which consist of some 4,000 institutions, is designing a huge multilingual portal for the dissemination of massive open online courses with the aim of connecting knowledge, research and results transference among universities, and the ubiquitous mobile audiovisual format will be one of its priorities (Vázquez Cano, 2013; p.90).

Thirdly, the results of our research lead us to focus on the students themselves. Just as a critical, analytical attitude and way of working was developed in students in the interpretation of the messages and content transmitted by text books, audiovisual material and newspapers, thereby cultivating a specific methodology, we now clearly understand that it is time to design a system of analysis for the production and exploitation of resources that can be accessed by mobile devices such as phones or laptops, since these are unstoppably and increasingly present in everyday life and the academic world of students, teachers, and at higher education centres and universities. These new media enable and should encourage us to develop a way to organize, represent and codify reality. We need to develop new elements of critical analysis and educate our students so that they can use the information available to them in a suitable and beneficial way (Sevillano García, 2014; p.297).

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DIFFERENTIATED TECHNOLOGY-BASED INTERVENTIONS FOR ENHANCING UNDERSTANDING, FLOW AND SELF-EFFICACY BY LEARNERS WITH DEVELOPMENTAL AND ATTENTION DEFICITS

Hanne Voldborg Andersen, Elsebeth Korsgaard Sorensen, Aalborg University, Denmark

Abstract

The purpose of this paper is to investigate in which way technologies may be used to increase inclusion and a feeling of flow and self-efficacy in learning processes when it comes to learners with developmental and attention deficits (focus learners) in a mainstream classroom. The paper is an outcome of a wider study on ICT facilitated inclusion and this current piece of research addresses the challenges of enhancing focus learners' comprehension when working with the curriculum. Several technologies have been tried out in a real school context and seven types of interventions are uncovered as valuable for focus learners' capability in learning processes. The paper discusses the findings and concludes that conscious use of technology-based interventions make it possible to provide learning challenges balanced to the learners' individual skills. But a broader understanding and acceptance by all stakeholders for the specific challenges of this group of learners in mainstream educational systems seems needed to fulfil the potential.

Introduction

Inclusion of learners with special educational needs (SEN) in mainstream schools appears an ambitious item in the educational-political agenda in Denmark, where bewilderment and frustration are common phenomena among teachers facing the challenge of teaching SEN learners (Baviskar, 2015). In general, teachers find themselves neither possessing the required specialized pedagogical knowledge and competencies to include youngsters with developmental and attention deficits (Danmarks Evalueringsinstitut, 2011) – nor the sufficient technological skills to utilise the affordances of digital learning resources for this group of learners (Andersen & Sorensen, 2016a). Learners with Developmental and Attention Deficits (in this paper: focus learners) are a broad and inhomogeneous group of children, who are challenged with respect to both life and learning. The term includes learners with Attention Deficit Hyperactivity Disorder (ADHD), Attention Deficit Disorder (ADD) or Autism Spectrum Disorder (ASD). To enable inclusion in terms of increasing presence, participation and achievements for focus learners, it is crucial that teachers have knowledge about the learners' specific challenges and competences: "In order truly to help someone else, I must understand more than he – but certainly first and foremost understand what he understands. If I do not do that, then my greater understanding does not help him at all"

(Kierkegaard, 1859). Likewise, teachers must be able and willing to arrange a learning environment in consideration of this knowledge: "If One Is Truly to Succeed in Leading a person to a Specific Place, One must First and Foremost Take Care to Find Him Where He Is and Begin There" (ibid.).

Children diagnosed with ASD often demonstrate restricted communication and social skills as well as a reduced repertoire of behaviours, interests or activities (Cihak et al., 2012). They might be unable to communicate their needs in an appropriate way or might engage in disruptive behaviours (ibid.), and their learning experiences will often be affected from echolalia, disorganisation, inattentiveness or stereotypic behaviours (Delano, 2007). Learners with ADD or ADHD are affected by the core symptoms of the diagnosis: attention difficulties and/or hyperactivity and impulsivity (Barkley, 2006). The problems include poor attention span, distractibility and difficulty staying on task, which impact their ability to manage time, to keep deadlines, to plan/organize schoolwork or to make friends. The symptoms are very sensitive to situation and context, the situated demands and the level of cognitive complexity in a task (ibid.). Low working memory often pose a barrier as it is necessary for control attention in complex cognitive processes as learning, understanding and reasoning (de la Guía et al., 2015). Focus learners often lack self-regulation, why they master skills at a lower level than their peers. They often experience themselves unable to cope with situations, where skills are demanded and incompetent about their performance. According to (Barkley, 2006) children with ADHD generally have low self-esteem and might easily be frustrated. That is why teachers must be aware to construct learning opportunities, which motivate these learners and encourage them to participate despite their problems.

Theoretical Approach

In Denmark focus learners with low self-esteem and lower skills are included in the mainstream education system without – or with limited – special educational support. They are taught in mainstream classes by mainstream teachers, who are searching for new ways to engage them and help them, and to enhance as well their feeling of flow (Csikszentmihalyi, 2014) in the task solving, and their learning outcome as their self-efficacy (Bandura, 1997). According to the Flow Theory (Csikszentmihalyi, 2014) it is necessary to ensure an appropriate balance between a person's ability and the challenge at hand to attain a feeling of satisfaction and inner motivation in a process. Flow can be experienced in situations, where a task is both challenging and shaped to the focus learner's skills, while an enharmonic balance between challenge and ability triggers anxiety, worry, apathy or boredom. Furthermore, a learner's belief in his or her ability to succeed in a situation or accomplish with a task (self-efficacy), also affects a person's approach to tasks and challenges. Bandura's (1997) social cognitive theory describes how individual's actions and reactions are influenced by actions they have observed in others, and how persons with high self-efficacy are more likely to see challenging tasks as something to be mastered, rather than something to be avoided. In other words, if you are to change focus learners' behaviour, you must change their beliefs. Schaffer (2013) states with his research that flow only appear under following conditions: (a) High

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perceived skills; (b) Knowing what to do; (c) Knowing how to do it; (d) Knowing how well you are doing; (e) Knowing where to go (if navigation is involved); (f) Freedom from distractions and (g) High perceived challenges.

Technology today is a natural part of people's life and impact many aspects of education, training and development. Education is a human right and disabled people should be provided appropriate support. Assistive technology (AT) is seen as a solution for providing this support and remove barriers in education (McKnight & Davies, 2012). They are internationally recognised as "a particular valuable tool for people with disabilities… [in order to] … improve their quality of life, reduce social inclusion and increase participation" (Waller & Watkins, 2013). A large number of assistive learning technologies have been investigated (ibid.), but "there is perhaps a tendency for research to focus on the technology rather than its uses" (McKnight & Davies, 2012) as e.g. development of technological tools (Bul et al., 2015), comparing tools (Hill & Flores, 2014) or evaluating the value of a function under specific circumstances (Kang et al., 2007). Furthermore, most literature on AT for the focus learners examines technologies used in therapy by psychologists (de la Guía et al., 2015) or by special education teachers (Cihak et al., 2012). Therefore, the authors of this paper call for investigations of the use of AT in the classroom. This paper examines how teachers have used AT to help focus learners to a more constructive confrontation with the learning content and experience a feeling of flow and self-efficacy in learning activities in mainstream classes.

Research Contexts and Design

This paper is an outcome from a wider research design, ididakt (Sorensen et al., 2013); an iterative and explorative qualitative research project, where data is collected in a real school context at public schools in Denmark. It is a case study in the frame of Educational Design Research (EDR) (McKenney & Reeves, 2012) with a hermeneutical, phenomenological interpretation of data. The authors/researchers have been professional dialog partners and facilitators in transformations processes at 11 schools, where they, in collaboration with 46 teachers, have examined the impacts of using ICT based interventions in 26 classes. More than 500 learners from 1st to 10th grade (age 6-16 years) were included in the project – among them 56 focus learners with extensive developmental or attention deficit disorders. The empirical data set consists of teachers' statements at seminars, in interviews or at a research blog, from surveys, interviews with school leaders or students and from classroom observations. A five-types-model of including, ICT based interventions are recognized and described in earlier iterations of the project (Sorensen & Andersen, 2016a; Sorensen & Andersen, 2016b; Andersen & Sorensen, 2016b; Andersen & Sorensen, 2015; Andersen, 2015), where this paper frames and examines ICT based interventions to enable and enhance *Differentiation & Comprehension*.

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Analysis and Findings

Several technologies have been used to facilitate differentiation and increase learners' comprehension in learning activities among the 26 classes. By categorising, analysing and interpreting data seven valuable ICT-based interventions which addresses this challenges are identified:

Digital Textbooks

Digital textbooks provide learners opportunities for using Reading Technologies (Text-to-speech) and listening to written text. Access to libraries of digital textbooks enable focus learners to choose books of interest and appropriate intellectual challenge AND get necessary reading support, which facilitate a balance between challenge and ability (flow) and enable independently reading (self-efficacy). They know what to do, how to do and are able to monitor their own progression in reading statistic and control questions. Digital texts make it easier as well to use digital writing support tools with impact on flow and self-efficacy:

> *"A couple of boys are now able to deliver a readable product, why they now get response as well" (Teacher G).*

Accessibility from any platform in school or at home has been helpful for learners with poor memory or planning skills:

> *"Now books are not forgotten at home or disappeared in school. Reading support is at hand both in school and at home" (Teacher G).*

Digital Course Portals

Publishers Digital Course Portals provide access to the full curriculum for a subject and contains texts, information, tasks, models etc. Learners find content at different levels of complexity with digital reading support at hand, supplemented with materials in various modalities as e.g. pictures, videos, graphics, sound clips, links or interactive features. It enables enhanced perspectives at, comprehension of and motivation for the topic in a sound balance between challenge and skills (flow). Focus learners have access to Digital Course Portals in both schools and at home; they know what to do and how to use the resources:

> *"The focus learners get started really focused. They are looking for information for answering an assignment. They read and make a quiz about what is learned. They choose between easy or difficult texts. They follow different media links and watch different kind of movies" (4^{th} grade).*

Focus learners monitor their own progression at the site:

> *"The reading log has been helpful to N (boy, 10^{th} grade) to keep track of his answers – it offers him an overview and simplify his options" (Teacher K).*

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Video Content

Video has been used to support differentiation and comprehension at the schools, but differently with learners as either *consumers* or *producers* of videos. When videos are provided as a part of the academic dissemination to all learners a more equally access to information are given:

> *"All learners must benefit from them. The instructions must be brief and clear" (Teacher B).*

The videos are either produced by teachers or derived from Youtube.com, digital learning resources or an online video resource. Some videos inform learners about procedures (e.g. how to navigate at Google Drive), other videos are used for enhancing learners' preliminary understanding, as explanations according to homework or instead of/as supplement to instructions in the classroom:

> *"Video has been used in Danish language, social studies and history. It is very good for learners with reading difficulties. All learners watch the videos, but some of them have in addition something to read. J (boy, 8th grade) can be concentrated in 20 minutes with a video" (Teacher J).*

Some focus learners do not at first benefit from videos:

> *"The impact is higher for learners with academically surplus energy. It is challenging, that the learners not are able to ask questions. I must still give them oral explanations and they can afterward use the videos to remember, what to do. That makes in return many learners self-sufficient" (Teacher F).*

But videos offer many focus learners a fine balance between challenge and skills:

> *"M (boy, 10th grade) can be concentrated very long time by them. He understands the Pythagoras after watching explanations and gives right answers afterwards." (Teacher K).*

Learners have easier access to knowledge, they can replay if needed and receive information in their own speed. Focus learners interact autonomously with the content and express self-efficacy:

> *"I am learning better with the computer because there are more options. I can e.g. watch video – and look at both video and text. It is easy for me to make notes because I can pause the video. It is much easier to use a video than to ask my teacher all the time" (girl, 8th grade).*

When classes are watching video at the classroom board, many focus learners take a break and drop out of activities. Videos seem to be more useful for individuals or peers where the focus learners can interact with or dialog about the content. Videos have also been used to sustain

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and visualise, what is learned – as an externalised memory or an alternative to classroom presentations. Such videos help focus learners to remember and guide them when shifting from one activity to another, and illustrate progression as well:

> *"I would continue with this method, because my focus learner (boy, 6th grade) had so much drive when creating the video. Normally he would not take part in such activities" (Teacher B).*

Video presentations are made by vulnerable learners, where the production of a video has prompted a feeling of confidence about their skills (self-efficacy):

> *"Presentation via video for B (boy, 4th grade). It was a good idea. He really liked that option. But when he saw his peers present, he wanted to do the same. So he did not use his video… He has so much non-attendance and it is very difficult for him to get into flow. Video presentation is a good idea as a backup. It would be fine, if everybody have this opportunity, and just chose in the moment, if they would like to present via video or in real life. Then it would be less stigmatising" (Teacher F).*

Digital Training resources

Digital Training Resources provide learners rehearsing specific skills and possibilities for choosing challenges that fits their capability. The program scaffolds them to know what to do, how to do and how well they are doing. They work in their own speed with a minimum of distractions and often feel both flow and self-efficacy when they find the programs interesting. Many focus learners express, that they like these predictable resources and teachers observe learners more focused and active in learning activities, where task solving is guided and response or help is available:

> *"M (boy, 10th grade) uses matematikfessor.dk. He follows explanations using good, closed, headphones and is able to stay at the tasks even with some noise around him. Normally he would do nothing" (Teacher K).*

Learning Games

The learning games scaffold – like the Digital Training Resources – learners and tell them what to do, how to do and monitor how well they are doing. They can work in their own speed with minimal distractions and obtain a feeling of flow. Several schools have tested learning games and the teachers' judgement is clear. Focus learners were more motivated and engaged when playing learning games and the tasks in the game were appropriate to their skills:

> *"A (boy, 4th grade) was very focused at the game. He wanted to continue at home, which is totally new for him. He should also continue in the school, but*

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> *unfortunately it is finished in few hours. It should have been more extensive – they are finishing the game to fast" (Teacher C).*

When it comes to learning games, some focus learners got a new role in the classroom:

> *"We used a learning game. N (boy, 6th grade) was really in play here and able to help his peers" (Teacher B).*

The learner states that he likes learning games because of the up-tempo and activities:

> *"It is not boring and slow".*

Some teachers have designed game based learning activities by themselves to enhance focus learners' motivation as e.g. a Run & Spell game with QR tags to provide restless focus learners more mobility in the lessons:

> *"I find these games really funny" (girl, 4th grade).*

Another teacher uses online resources to test and monitor how well his learners are doing. He finds quizzes motivating because of the competition between learners and the immediate feedback. He states it is easy to conduct quizzes and sees them as funny activities at the end of the lessons.

Assistive Reading and Writing Technologies

Assistive reading technologies read text aloud for learners while writing technologies offers learners word suggestions, help them spelling or write what they are saying. Assistive Reading and Writing Technologies helps focus learners to feel flow and self-efficacy:

> *"We have used it for some years now. Earlier, I found it very difficult to write a text. I made a lot of failures and all sounded wrong. Now it is easier. When I got it, I wrote a whole story, and it was almost right. Then I was happy and joyful and thought it was funny to write" (girl, 4th grade).*

Almost every focus learner in the project mention Assistive Reading and Writing Technologies as valuable tools they would recommend to other learners. Slow readers or learners with reading difficulties appreciate to

> *"hear the reading while being attentive at the text" (6th and 7th grade).*

Reading and writing technologies helps them to work more independently (self-efficacy):

> *"Then I do not need help from the teacher all the time" (boy, 6th grade).*

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Individual and Shared Summary/Comprehension Tools

Some schools successfully use digital tools to foster summaries of the individual learners' comprehensions, as e.g. *Word-of-wisdom-blogs*, *Concept-mind-map* or *Expectation-Diaries*. Such interventions give learners a place for reflection, reification and evaluation of what they have done and learned. It seems valuable for focus learners to compile their experiences of success and development. Likewise, many schools start using shared digital platforms to gather all learning material for the classes. It was a learning process to design and use these new Virtual Learning Environments (VLEs), but after a period of experiments, adaptions and modification they offered learners a great help in their learning processes:

> *"Google Websites is a good resource in Danish Language, where all topics from all years are compiled. All learners can see, what the peers have made. They learn to find help from other learners and be respectful for that. We have e.g. structured a novel reading course with on page for introduction to the novel, another with tasks before reading, a third while reading and a fourth after reading. Tasks are compiled and different modalities are used for information, instruction, analysis models etc. The learners return to and compile with earlier work. It works well for all learners that content and contributions in a subject are structured and gathered. They can add text, pictures or videos to support their individually comprehension" (Teacher B).*

Discussion and Perspectives

Even though we during this paper have enlightened how valuable digital resources can be, our research has also uncovered some negative implications. In order to keep a high arousal, a feeling of control and flow it is important that focus learners meet both high-perceived challenges and skills. But many of our focus learners are – due to their deficits – years behind their peers developmentally, socially and academically. In mainstream classrooms, they often meet the same tasks as their peers, and even though they might get a helping hand or an assisting tool, they still will be evaluated against the same curriculum. This impacts their experience of self-efficacy or being good enough. Teachers are frustrated, when they cannot appreciate and acknowledge focus learners' progression with marks in relation to their actual growth.

> *"I tell him he is doing well, but tomorrow he will have his marks, and then I know his courage will fail and he will stop trusting me." (Teacher J).*

We cannot expect learners to grow in the same speed. The same problem is noticed in relation to assistive reading and writing technologies: When teachers encourage learners to use text-to-speech or speech-to-text-tools other teachers, parents or peers express, it is a kind of "cheating". It seems important to clarify the purpose of reading and writing activities for all stakeholders: "To be able to read or write" or "To learn as much as possible and express knowledge and thoughts"? An inclusive school should generate a Universal Design for

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Learning approach – not only when developing, buying or providing assistive tools – but also when it comes to pedagogy and policies. We have experienced how pedagogical deliberate introductions to and use of Virtual Learning Environments, digital resources and assistive tools impact focus learners self-efficacy in terms of knowing what and how to do things:

> *"We have many academically weak children in our classes and observes how CDord (reading/writing technology) makes them much more autonomic. It is difficult to find good reading materials to weak readers, but now they can unassisted read and be more at the same level as their peers" (Teacher J).*

Unfortunately, we have seen, that many teachers do not know how to use these technologies, which is why they cannot support focus learners and leave them on their own.

The value of technology-based interventions and assistive tools depends on the individual focus learner's deficits and challenges. When it e.g. comes to learners who are years behind their peers with small vocabulary, poor comprehension or weak memory they might need alternative pedagogical initiatives and approaches than the mainstream teaching practice offers:

> *"He (boy, 6th grade) has been at a special education school for three years. He cannot just jump into the curriculum here. He can read using technology, but he might not understand the words. We must help him step by step" (Teacher G).*

It seems difficult for teachers to help learners with weak working or short time memory:

> *"M (girl, 4th grade) finds math videos of relevance for what we are doing in the lessons. Videos for the lower classes are short and simple. Then she is concentrated. When they are getting longer with more operations involved – it is difficult for her to remain on task" (Teacher D).*

We will suggest further research in rehearsing memory capability, which seems crucial for a major part of our focus learners learning outcome. Gathering all learning materials into online portals improve focus learners access to learning experiences (e.g. enable differentiation, several modalities or repetition). Navigation in the VLE seems problematic for some focus learners why teachers must be aware of designing a simple and clear path to materials and keep away unnecessary distractions. Teachers must see themselves as role models for learners and provide focus learners simple learning pathways and structures to scaffold them in both the digital and real-world classroom. Schools must have a critical view on Human Computer Interaction at learning resources: How easy and intuitive is the navigation when the learner is 6, 10 or 14 years old? It is a child friendly learning environment or a measure friendly technology? Tests, quizzes, games, training resources etc. have been used in many of the investigated classes with both positive and negative impact for focus learners. With no differentiation and evaluation against the same goals, with time-limitations

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and competition it seems as a stressful adventure for our focus learners. It might be fairer to them, if learning groups were designed after stage rather than age. And it might be of greater value, if schools were more focused on facilitation of reification, meta-reflections and formative evaluation instead of narrow-minded focus on measuring, data documentation and summative quantitative reports of learning outcome. Teachers have during the project described, how they often feel guilty, because they know full well the focus learners' specific needs without being able to offer them what is needed. Half of the teachers do not feel competent pedagogically or technologically to design technology-based interventions for the target group and state that they neither have sufficient time for designing individual material, explanations and structures for a focus learner's full day at school. Many examples of successful interaction of technology and pedagogic have been found. But they are used in flash – from time to time – and not a consistent practise in the focus learners' time at school.

Conclusion

This paper has investigated the potential of technology-based interventions for differentiating learning experiences and increasing comprehension by learners with attention and developmental deficits (focus learners). We have observed how digital textbooks, digital course portals, video materials, digital training resources, learning games, reading and writing technologies and individual or shared summary tools have been used in 26 classes with more than 500 learners and successfully assisted 56 focus learners in their learning experiences. For teachers with both pedagogical and technological insight it seems to be possible to exploit this favourable potential in their classroom teaching and increase both a feeling of flow and self-efficacy in learning processes among this group of vulnerable focus learners. When using technology-based interventions consciously it is possible to provide learning challenges balanced to learner skills, and take advantage of the power of technologies in order to help learners overview what to do, how to do, where to go and how well they are doing. Our research has unveiled how technologies are able to minimise distractions for unattended learners, but it depends on teachers' classroom management in both real world and virtual environment settings. On the other hand, technologies may also be confusing for focus learners and provide distractions. If technology should be utilised to its full including potential it is necessary for schools not only to buy and provide technologies, but also use it in a Universal Design for Learning approach that gives all individuals equal opportunities to learn, allow them to meet learning challenges balanced to their actual skills and to grow in their own speed. Even though this investigation has shown us a lot of examples where technology and pedagogy interact successfully and increase focus learners' ability to be more self-driven and more actively participating in an including learning community, good examples only still appear in flashes and yet not as a consistent practise in the focus learners' time at school. To foster an including school system a much broader understanding and acceptance is needed by all stakeholders of this group of learners with respect to their specific challenges in the mainstream educational system.

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USING DIGITAL TECHNOLOGIES FOR INCLUSION THROUGH STRENGTHENING PARTICIPATION AND CONTRIBUTION FOR LEARNERS WITH DEVELOPMENTAL AND ATTENTION DEFICITS

Elsebeth Korsgaard Sorensen, Hanne Voldborg Andersen, Aalborg University, Denmark

Abstract

This paper investigates the potential of digital technologies for strengthening the participation and inclusion of learners with developmental and attention Deficits (focus learners) into the mainstream classroom. The paper describes the authors' approach to the challenge of researching the extent, to which digital technologies may support the learning process of focus learners – in particular in those aspects of the learning process that deal with the construction of learning products and the communication and dissemination of knowledge to peers. On the basis of the actual analysis and a succeeding discussion, the paper concludes with a description of the findings.

Introduction

It is beyond any doubt that the last decade of digital technologies and social networks has produced a changed educational environment (Conole, 2013). New possibilities for digital educational approaches, tasks and methods have come into focus. In general, this situation has offered new possibilities for inventing novel pedagogies resting on the affordances and utilization of digital technologies. It has enabled new educational designs, which – to a higher extent than earlier – rest on pedagogical bottom-up approaches (e.g. Sorensen, 2014), which offer learners an alternative way of becoming involved in the educational process as true agents. Simultaneously, the societal/governmental demand has increased dramatically in terms of schools to be able to include children with special educational needs (SEN) in the mainstream classroom.

The present paper uses the term *focus learners* to denote youngsters with developmental and attention deficits as e.g. Attention Deficit Hyperactivity Disorder (ADHD), Attention Deficit Disorder (ADD) or Autism Spectrum Disorder (ASD). It addresses the challenge of including *focus learners*, i.e. youngsters with developmental and attention deficits (see Andersen & Sorensen, 2015, for a more detailed description of the characteristics of the target group). The characteristics and symptoms of the group seem sensitive to the situated demands and the level of cognitive complexity of a task (Barkley, 2006). Their attention can rapidly fluctuate, and they are driven mainly by motivation arising from their hyperactivity and impulsivity. It is widely recognised, that children with developmental and attention deficits call for both support, praise, acknowledgement and appreciation combined with clarity, aid and strategies to master complications in their tasks at school (ibid.). Poor school performance, social problems with peers and authorities (e.g. parents and teachers) combined with lacking self-confidence or self-esteem draw the picture of many youngsters with ADHD, where 65 % of them are still affected by their ADHD in the adulthood (Faraone et al., 2005). The number of learners in primary and secondary schools with challenges as described above has increased tremendously over the last decades (Due et al., 2014). Both teachers and schools are desperately looking for new methods and approaches to help the inclusion of focus learners in the mainstream school system (EVA, 2011). The contribution of this paper is to investigate whether the potential of digital technologies may contribute to support the challenge of inclusion in schools of youngsters with developmental and attention deficits.

Analytical optic

> *"Experience is, for me, the highest authority. The touchstone of validity is my own experience. No other person's ideas, and none of my own ideas, are as authoritative as my experience. It is to experience that I must return again and again, to discover a closer approximation to truth as it is in the process of becoming in me." Rogers (1961; pp.23-24).*

From this viewpoint it becomes quite clear that – as claimed by both Rogers (1961) and later confirmed by Wenger (1998) – it is not possible to teach another person "directly". Rather, it is possible only to humbly facilitate his learning (Smith, 2004). But how, then, more closely, may the affordances of digital tools that facilitate genuine inclusive learning be assessed and understood? Dalsgaard and Sorensen (2008; pp.272-279) offer a typology for digital tools that group these according to the indisputable affordances they offer in relation to two main types of functionality of learning: (a) *Participation in processes of communication* (dialoguing and stimulating the creation of communicative networks and awareness); (b) *Participation in processes of production* (using digital technologies to create and share digital products). Andersen & Sorensen (2015) sees a great potential in these types of technologies, also for focus learners. Being utilized in the hands of teachers as tools for helping the inclusion in mainstream classrooms of youngsters with developmental deficits and difficulties in focusing attention (ibid. Sorensen, Andersen & Grum, 2013; pp.389-397) creates great expectations with respect to *empowering* learners and helping the *process of inclusion*. Empowerment may be defined as the ability and power to control ones own life in a manner that makes space for understanding, influence, and meaningfulness in a way that promotes insight, transparency and ability to act as an active citizen. Empowerment is *both a process and a goal* in itself (Hoskins et al., 2006; Meyer et al., 2007; Sorensen, 2014). But which qualities of learning, does a process of *genuine inclusive learning* carry along? In Rogers' concept *experiential learning*, the main focus is on *personal change and growth* – and on the experience of the learner of being included. While generally acknowledging the significance of collaborative learning methods, Sorensen and Ò Murchú (2005) – inspired by Rogers (1969) and Colaizzi (1978) – presents an attractive existential understanding of the concept *genuine inclusive learning*. The

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following principles for *when* authentic inclusive learning can be said to take place, may be distilled: (a) When a learner participates and controls a significant, relevant process that is true to him/her; (b) when a learner participates and external threats are low; and (c) when reflection and meta learning (i.e. learning-to-learn) are the primary methods of assessing progress or success. Using the above generated optic, this paper wishes to explore the ways in which *digital modes of expression* and opportunities for *participation in processes of production of visible reifications* (i.e. structures for constructing, disseminating, reifying) may assist the inclusion of youngsters with developmental difficulties and difficulties in focusing attention: How may focus learners enhance their possibilities for developing a conscious and reflective understanding of their own capabilities and competencies?

Research design

This piece of research is one of the outcomes from a wider research design, ididakt by Andersen and Sorensen (2015), Andersen (2015) and Sorensen, Andersen & Grum (2013). Ididakt is an iterative and explorative qualitative research project, where data is collected in a real school context. It is a case study in the frame of EDR [Educational Design Research] using a hermeneutical, phenomenological interpretation of data. EDR is a "genre of research, in which the iterative development of solutions to practical and complex educational problems also provides the context for empirical investigations, which yields theoretical understanding that can inform the work of others" (McKenney & Reeves, 2012 p.7). A key element in the research design is that the research process integrate the teachers and goes hand in hand with their work and interventions into the field of study, and become a learning process for them in how to work with SEN learners and integrating ICT in the classroom and that the research process takes place in the real life context of the mainstream classroom (Andersen & Sorensen, 2015). An intervention model mirroring five types of ICT-based interventions was concluded (Andersen & Sorensen, 2015). While these five intervention types are presented and discussed in five separate research papers (e.g. Sorensen & Andersen, 2016a; Andersen & Sorensen, 2016b), this paper will be dealing with the extent to which participation and contribution of focus learners may be enhanced through the use of the ICT-based intervention, "Production & Dissemination" (Andersen & Sorensen, 2015, Figure 1).

Analysis and findings

Digital technologies have been used across 26 classes to facilitate and strengthen learners' participation in aspects of the learning process, such as the production of learning reifications and the distribution of learning activities. Table 1 mirrors the overall implementation of interventions in contexts of "Production & Dissemination" (Andersen & Sorensen, 2015, figure 1), as well as the specific impact from the analysis. Our analysis may be grouped in three overall types of interventions in the learning process, with regard to supporting learner participation: (a) Digital templates/structures scaffolding individual learning PROCESS; (b) Digital structures/templates scaffolding PRODUCT creation; (c) Digital structures/templates ASSISTING reading and writing (facilitating comprehension and communication).

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Table 1: Overall implementation in use context, and impact of intervention types on participation

Overall types of interventions in use context	Digital templates/structures *scaffolding learning PROCESS* for creation of text, image and video (e.g. writing templates, tools for sound/video production, PowerPoint, GoogleSlide and BookCreator, etc.)	Digital structures/templates *scaffolding reification of PRODUCT* (e.g. presentation tools, multi-modal production tools, Google Slides, Google Docs, etc.)	Digital structures/templates *ASSISTING reading and writing* (*comprehension and communication*) (e.g. Dictus, CDord, VoiceAssistant, AppWriter, etc.)
Impact on participation	- creating "safe ground" - supporting motivation - supporting multimodal expression and communication - helping contribution - helping collaboration - reducing risks - reducing anxiety	- appear open/inviting - provides structure and guidance - support multimodal expression and communication - reduces learner insecurity support sharing and disseminating	- teachers report unambigiously that these tools creates opportunity for participation

The more detailed analysis of each of the three groups of interventions is organized according to the parameters of learning quality they involve and support.

Digital templates/structures for individual learning PROCESS

In terms of digital tools and templates for structuring and managing PROCESS, teachers report that several learners experience structural support for the management of learners' processes. Interventions with structuring tools/interventions are likely to facilitate *enhanced participation* of learners. While providing structures/templates that give more overview and guidance of the task at hand, learners are more likely to feel inclined to *participate*, if their level of frustration is comfortable. Structures/templates scaffold enhanced understanding and stimulates a feeling of *safe ground* to act. The templates appear flexible in terms of learners themselves being able to adjust the level of support to their needs. The tools have also been said to possess the potential, easily and comprehensively, to bring and facilitate fun into the classroom – i.e. *supporting motivation*. Teachers have been using writing templates as well as sound and video supporting tools to create a feeling of safety in learners and for the purpose of enabling and framing learners' use of *multimodal expressions* in their learning products: "He [the focus learner] needs a frame to become motivated to solve a written assignment" (teacher statement, School F, 4th grade). Moreover, the teachers have also used tools (e.g. BookCreator) for supporting the coupling of various *modes of expression* into a whole *reification* (e.g. a book) that aims at reifying a whole product or outcome of a learner's learning process. The affordances of these tools seem to be concerned with their support of holistic multimodal types of expressions and representations of a longer process (e.g. a narrative). Helped by this type of technologies, teachers also, experienced *growth of focus learners* to become able to actively *participate* in the learning process "B has independently

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succeeded in solving the assignment within the lesson (…) systematically using the template. It is the first time in my experience that B has independently solved a written assignment during the school day" (teacher statement, School F, 4th grade). It provides the learner with self-esteem and most likely increases his feeling of being-able-to: "I have adapted templates … they fit to us and there is a correlation and familiarity with process and template" (teacher statement, 4th grade). Teachers see indications that learner motivation increases through the use of writing boxes, image boxes, etc. and through experiencing humour and enjoyment: "learners express enjoyment, and emphasize that it has been a fun experience – a success – to write and draw images of the main character. None of them wants to work without a template. "Our focus learners find it difficult to structure a text" (teacher statement, (School B, 7th grade). Focus learners "display *motivation*, assume *responsibility* and display ownership throughout the whole task" (teacher statement, School C, 4th grade). These tools enable learners themselves to adjust the level of scaffolding and, potentially, increase or decrease the level of scaffolding, and "instructions and explanations may be supplemented, multi-modally, with sound and images" (teacher statement, School A, 7th grade). Teachers stress that improvement is happening, when they utilize structuring tools for focus learners "success with the BookCreator template, containing writing boxes, image boxes, etc.; focus learner gets motivated, assumes responsibility, demonstrate ownership and remains participating during the whole assignment" (teacher statement, School J, 8th grade). This experience of increased empowerments is also gained in the lower level classes: "learner could independently and systematically carry out the task within the timespan of the lesson. It is the first time I have experienced that this learners has actually independently carried out and handed in a written assignment without an extension of time" (teacher statement, School F, 4th grade). Also in terms of motivation a positive experience is made: "the learner has succeeded in writing a story in the template. He states that he had a good process" (teacher statement, School F, 4th grade). But we also meet with disillusioned statements from the teachers concerning their use (or non-use) of digital tools: "I have downloaded the software, but it does not work, neither on my own iPad, nor the iPad of the school" and "I cannot come back again after an attempt to mail my text out of iVoice, and I cannot find an overview of the texts that I have recorded" (teacher statement, School C, 6th grade). The digital tools and templates seem in some cases to actually spawn teacher experiences of focus learners gaining a *feeling of being included*. Collegially, the teachers also communicate amongst them. We tried to convince teachers to start using Dictus for learners and, before the learners go to independent boarding school in the 9th grade. But teachers comment that "there is not enough time to teach them use Dictus" or "could you not arrange a free test period? But who would be helping them with access, installation etc., so we did not offer that". This feeling of powerlessness among teachers seems a very frequent and general problem (Andersen & Sorensen, 2016b). Teachers assert that learners seem to lack qualifications about "contributing" in a digital world, and that using structures/templates more easily stimulates and maintains not only learner participation, but also learners contributing and learners collaborating: "B and his peer seek on the internet an answer to their assignment. When they return, their text is gone. They have to start all over again. Learners are not used to inserting images from the internet – they don't know the

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method" (teacher F, 4th grade). *Reducing risks* and empowering learners that do not have faith in themselves and their own abilities is not a simple pedagogic task. Often the teachers detect a level of insecurity, which causes focus learners to stay "under the radar", i.e. causes them to want to "hide" instead of taking communicative, collaborative or other social initiatives. Too many defeats and experiences with the systems are likely to cause them – like burned children – to withdraw from taking initiatives, or to experience anxiety: "For M it is about structure in relation to content, for B it is about fear related to the white paper. He needs a frame in order to feel motivated and to dare solving a written assignment" (teacher statement, School F, 4th grade).

Digital structures/templates for PRODUCT creation

It is important for learners to be able to *reify learning items* (e.g. create and disseminate) and mirror learning processes. In terms of digital tools for reifying and for facilitating PRODUCT creation, teachers report that several learners find structural support as well as support for more "rich" expression through multimodal expression and visual communication. Templates seem to provide *general support for various tasks*. Teachers report that they help learners in general, as well as focus learners: "The templates provides support for everyone, and learners with surplus are able to break the frames. The structure of templates do not constrain anyone, it is open and inviting – not close and inhibiting. It benefits all learners" (teacher statement, School B, 7th grade). It helps them to structure their task. "Perhaps it can be a good idea in certain situations to have a common sound file, which he may use as brainstorm for the succeeding writing work in Dictus" (teacher statement, School B, 6th grade). "It gives them stabile frames facing an otherwise open and wide task" (teacher statement, School I, 2nd grade). "An example of good use of a *structuring intervention*" (teacher statement, School A, 7th grade): "We use a BookCreator book with a literary assignment to work with a youth novel. We start with a description of the goal and pieces of the task, so the learners themselves can turn up and down for the level of scaffolding. The written presentations are in several places accompanied by digital sound and image recordings, with instructions and explanations. Perhaps it is a good idea using a common sound file, which he may use as brainstorm for the succeeding work in Dictus" (teacher statement, School A, 7th grade). Several teachers look upon structuring tools (e.g. BookCreator) as user friendly tools that are able to scaffold the creation of a product in a fast and easy manner: "User-friendly tool, with a book as a quick result. The learner may easily navigate and orient himself via recognizable icons, headings and text boxes" (teacher statement, School d, 4th grade). Digital technologies offer possibilities for *multimodal expressions/communication* amongst learners. "The tasks the learners are supposed to carry out vary between written, sound or image production. The learners can continuously choose which task they engage with/in and which form of expression they want to use" (teacher statement, School A, 7th grade). Technologies (open educational resources), however, are not always perceived by teachers as simple pedagogical tools: "A student by accident erases everything. It is difficult on iPads, on which there is no undo-bottom in apps" (teacher statement, School I, 2nd grade). But there is also the opposite experience: "R is doing well, when he is allowed to work multi-modally. He has done well with a home assignment on

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family heritage" (teacher statement, School B, 6th grade). Teachers may help learners *to produce reifications* of their learning processes and their work. This may be done in a variety of ways. "The teacher may put in relevant concepts and ask the class to reflect and reify" (teacher statement, School F, 4th grade). "Learners work in PowerPoint or Prezi. They are to make an assignment about Punk. They are working independently, or in pairs" (Observations, 10th grade). A focus learner use a tablet and a speech-to-text software. "It is because it helps a lot" (teacher statement, School B, 6th grade). It enables learners to produce written texts verbally. An example of a way of working multi-modally: "Learners make re-tellings of Soria Moria castle in iMovie and upload to Skoletube. They produce together in groups part of the story, and they produce the illustrations. In this way they learn – zooming in and out – how they may use several illustrations in the same drawing. Learners produce keywords for their stories. They are not reading, when they produce speak-over. They must repeat in their own words. They produce keywords – and practice" (Observations, 4th grade). In general, it seems that the book template spawns motivation, ownership, and learner responsibility. In sum, digital structures appear to be fruitful tools supporting participation and inclusion, as they structure the learning process and, thus, invite, enable and empower the learner to participate.

Digital structures/templates ASSISTING reading and writing (facilitating comprehension and communication)

Teachers observe that a large proportion of focus learners seem inhibited by difficulties in reading and writing (facilitating comprehension and communication). This affects their processes of acquisition and dissemination of knowledge. In terms of digital templates/tools and digital interventions for ASSISTING focus learners' comprehension and communication, teachers report of a high level of unambiguous success. Also focus learners themselves seem to feel that these technologies widen and extend their visibility and abilities. They course them to more easily communicate, write and share with each other. Now, which types of assistive technologies are better to work with? Learners mention Dictus, as Dictus is able to write what is said via a Nexus tablet. It is popular in all subjects. A teacher recommends the Nexus tablet to learners from the point of view that it fits with Dictus: "It is because Dictus helps a lot" (teacher statement, School B, 6th grade). Another teacher F mentions writing software (Word) as the best type of software for her on the computer, because CDord functions with that. This is not the case with SmartNotebook, which she otherwise normally likes to use, because "it allows me to write many strange letters and invites me to make a beautiful layout" (learner, 4th grade).

Discussion

Our investigation has employed digital tools and interventions in learning situations with the aims of supporting, in particular (a) the facilitation of PROCESS, (b) the creation of PRODUCTS and, finally, (c) the ASSISTANCE with aspects of comprehension and communication. This analysis has demonstrated how various types of digital tools may be considered tools for inclusion as well. It becomes clear that good quality interventions with digital technology *invite and support participation and dialogue* – also in the *planning of the*

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learning process of the individual focus learner. Good quality interventions incorporate *opportunities for reflection*, tools and *structures for construction* and *dissemination* of their knowledge (to demonstrate "I am able to"), diverse, multimodal and assistive digital modes for communicating, collaborating and contributing. This promotes basic democratic and empowering skills, such as e.g. learning how to listen to other voices (Wegerif, 2016). Thus, to interact and dialogue with the focus learner and then decide about relevant questions to be investigated, enhances both *ownership* and *awareness* in the focus learner about his/her own process. The analysis above, organized in different categories, shows that digital technologies and interventions to a certain extent seem to provide focus learners with "handy" methods and tools for managing and participating in learning processes. It is vital in the process of *becoming aware* to employ the digital tools to *facilitate reifications* (visualization, organisations, etc.) so that focus learners get to see/realize what they themselves KNOW. Our analysis is organized in categories showing that focus learners gain a lot of help, support and opportunity from teachers' interventions with digital tools. This is likely to promote their feeling of being included. Alenkærs's definition of inclusion (Alenkær, 2013) views inclusion as a dynamic and continuous process, which seeks to develop the opportunities of any learner for participating and gaining in all parts of society. Dressed in the words of the Danish philosopher, Soren Kierkegaard, who used the concept "Hin Enkelte" to denote an including attitude and stress that every individual – irrespectively of prerequisites – is unique and valuable in life (Kierkegaard, 1843). To be included is in itself a life value for the unique individual/learner. To feel included, a learner must feel safe and secure in the learning endeavour. The reversibility of learning actions in a digital learning environment makes it much safer for focus learners to navigate in a "safe" environment. Reducing risks in the processes of creating learning products and reifying processes of learning is important to ensure that focus learners will have a voice in the choir of change and the democratic advancement of society.

Conclusion

The digital technologies and interventions seem to act as a vehicle for enabling inclusion of focus learners through transparent what focus learners are actually able to do. Using technologies enables them to observe, inspect and reflect upon their own learning (their level of knowledge and process of learning), and to disseminate, demonstrate and make visible – through reifications – their own learning. In order to create ownership, pedagogic strategies and interventions with digital technologies (whether viewed from the perspective of teaching or the perspective of learning) should incorporate opportunities for developing digital reifications. These, in turn, then stimulate learner reflection and awareness. The authors of this paper emphasize importance of *opportunities for reflection*, *tools and structures for construction and dissemination* of learners' knowledge (to demonstrate "I am able to"). In addition, multimodal and diverse digital modes for communicating, collaborating and contributing to promoting basic democratic and empowering skills, such as e.g. learning how to listen to other voices (Wegerif, 2016). To reduce risks, any fruitful pedagogical approach should employ digital technologies and interventions in ways that *empower learners* and

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promote a learner *experience of inclusion*, and a feeling of being recognized as a valuable participating and *contributing* member of a group of peers sharing an inescapable context of *mutual collaboration*, dialogue and collaborative knowledge building (CKB) (Sorensen & Andersen, 2016a; 2016b). The analysis has shown that learning interventions with digital technologies make focus learners thrive with a more full-registered – digital and multimodal – way of expressing themselves. While it invites and enables them to act in a new way, it also empowers them to take collaborative and multimodal communicative initiatives and, thus, express themselves more and better. The interventions and smoothness and reversibility of digital actions cause them to feel safe and secure, and stimulates their inclination and courage to participate and interact, to become interested and authentically involved with tasks, assignments, other students. It simply causes them to feel inclined to share, communicate and interact around learning endeavours, to feel ownership to their own learning processes.

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VIDEO IN HIGHER EDUCATION: EXAMINING GOOD PRACTICES

Ilse Sistermans, Maastricht University, the Netherlands

Summary

Currently Maastricht University is at the conclusive phase of a video project, aimed at creating an institution wide video support service. One of the deliverables is collecting and sharing good practices on the use of video in education. Good practices were collected by interviewing support staff members at Dutch higher education institutes. Additional information was obtained from academic publications, SURF events and special national interest groups on media in higher education (SURF is the collaborative ICT organisation for Dutch education and research – https://www.surf.nl/en/about-surf). A collection of these good practices are presented in this paper.

As Maastricht University is a face to face university that uses a problem based learning (PBL) methodology, the section on didactics focuses on PBL in a face-to-face setting. Nevertheless, the collection of good practices presented, may be of interest to teaching and support staff members involved in the use of video in at any higher education institute.

Before addressing good practices of video in education, the paper defines and categorises video. Then a collection of good practices, is presented, divided into in four domains: (a) education, (b) layout (c) support, and (d) production. The section on education deals with flipping the classroom and other forms of blended learning. The practices presented in layout, support and production are applicable to most higher education institutes, both face to face and online. The goal of the paper is to inspire and inform higher education teachers, support staff and managers.

Introduction

Over the last decades, video is playing a more prominent role in higher education. To provide better support to teachers who wish to embed video into their education, Maastricht University has started a video project aimed at creating an institution wide video service, a project that is now in its conclusive phase. One of the project deliverables is a collection of best practices on the use of video in higher education to be shared with stakeholders and presented on the video web portal that is under construction at the time of this paper.

Good practices were collected from interviews with twenty-seven teaching and support staff members of fourteen higher education institutes, as well as twenty-six staff members of Maastricht University. In addition, members of the video project team gathered information from academic publications, SURF events and special interest groups (SIG's) on media in higher education.

The findings, good practices in terms of education, video lay-out, production and support, are presented in this paper. The goal is to inspire and inform higher education teach and support staff and managers who intend to embed video into their education and or who are searching for better ways to support the use of video within their higher education institute, faculty or department.

Defining video

Video can be roughly divided into three categories: live stream; lecture registration and knowledge/skills clips.

- *Live stream* – refers to broadcasting the video as it happens, e.g. a lecture held in a lecture hall or a studio, with or without or without a live audience, with different levels of interaction (live chat, the use of voting tools and conferencing tools).
- *Lecture registration* – refers to recording an entire lecture and making it available to students at a later stage. In general, it involves few didactical changes.
- *Knowledge clips and skills clips* – and other clips made by teaching staff or students (student generated clips) are short videos that focus on one or a few topics. Generally, the goal is to remove one-way transmission of knowledge from the classroom and/or to promote interaction and activate students.

Classification of video according to format

Hansch et al. (2015; p.21) came up with a typology of videos according to their production formats, e.g. animations, animated slides, webcam captures and pen casts. Each format requires different tools and forms of support.

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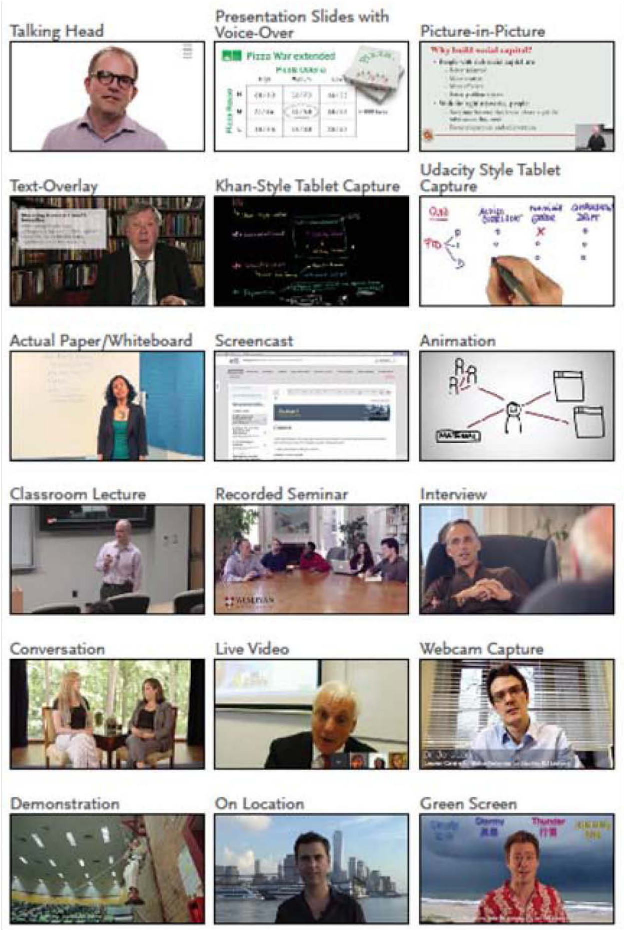

Figure 1. Typology of video production formats (Hansch et al., 2015; p.21)

Classification of videos according to learning goals

Many of the interviewees use video to remove transmission of knowledge (one-way communication) from their lecture hall or classroom, and enhance interactivity during contact time. In this context, the term *flipping the classroom* is often used. Various best practices on education in this report, will deal with these learning goals in more depth.

A taxonomy of videos according to their learning goal (this list is not all inclusive):

1. Introduction of a study or course (PR), faculty or course for potential students.
2. Introduction of a course or assignment replaces introductory lesson and partly replaces the syllabus.
3. Skills clip, show how to perform a skill for instance, before going into a skills lab; saves costly lab time.
4. Mini-lecture (10-30 minutes). The original lecture is chopped up into smaller lectures.
5. Knowledge clip (2-5 minutes) on a basic concept or on a difficult part of theory or on a step by step process (e.g. a complicated formula or sum). Often recorded by a tutor, teacher or an expert in the field.

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6. Feedback clip. A teacher shares a recorded clip to provide students with feedback on their assignments, in class contributions or exam questions.
7. Interview with an expert. A (series of) interview(s) with an expert in the field.
8. Student generated clip. Replaces or enriches a written assignment or facilitates a students' demonstration of an acquired theory or skill.
9. Experiential video (Koumi, 2006) – Brings fieldwork or real life experience into the classroom.
10. Fictional clip or film a film that shows a fictional story in order to personalise concepts and ideas.

Good Practices

Answers provided by the interviewed teaching staff and support staff, reveal that the good practices can be divided into different categories, namely: education, video design, production and support.

Good practices in education

Virtually each interviewee indicated that embedding videos into a course is only successful when carefully aligned with learning goals and activities. Zac Woolfitt (InHolland) provides a few examples of students activities that may be coupled with watching videos: an (online) assessment, group discussions; creating mind maps; explaining the content to one another; and design a quiz questions for a video.

Figure 2.

Flipping the classroom

Flipping the classroom is reversing the roles, meaning that teachers become students and students become teachers, or, students do at home what they use to do in class and vice versa. The goal is to activate students and promote higher order learning skills. Video is an excellent tool to support flipping; lectures are recorded or transformed into short clips so that face-to-face time can be used for Q&A, collaboratively doing assignments or (PBL) discussions. A great number of the interviewed teachers uses video as a tool to flip the classroom and/or activate students and promote higher order learning skills.

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Many interviewees indicated that flipping the classroom is a very time consuming process as it involves redesigning the entire course. Most added that their efforts were well rewarded by the positive impact on face-to-face sessions: students become more engaged and activated and many reported better results. Alexandra Montague and Luisa Arrivilaga (Zuyd) spent an entire summer on the preparation of flipping their Spanish course. Their efforts were rewarded with a drop of 30% to 15% failure rate and with students who changed from passive listeners into active participants (March 15, 2016).

Using existing video for flipping

Some interviewees use open learning materials (creative commons license); others use sites with educational videos for pay (Ilonka Hebels, April 8, 2016 and Luisa Arrivilaga, March 15, 2016). Carijn Beumer (Maastricht University) also uses existing video in her flipped PBL classes in her Global Dynamics on sustainability course. As literature on sustainability tends to have a pessimistic outlook, she searched for videos with a more positive message, and found Ted Talks and a number of documentaries. Moreover, images better convey difficult concepts. She coupled her videos with a discussion or an assessment (Carijn Beumer, May 25, 2016).

Expert guest lecture on video

Teacher and course coordinator Nynke de Jong, at Maastricht University Faculty of Health, Life Sciences and Medicine, has flipped her entire course. In the old situation, the guest lecturers delivered the introductory lecture and left. Students would do their group assignment and presentation at the end of the course with their own teacher present. The potential level contribution from the expert was not optimised, as he was available to the students at a time they had not yet started on the course material. The teacher resolved to fly to England to record a small number of interviews with the guest lecturer, to replace the opening guest lecture with. In the new situation, they attend the last session instead of the first one. By doing so, he can attend all student presentations, provide expert feedback and participate in the post-discussion.

Introduction and feedback clips to replace pre- and post-discussion

At Maastricht University Law Faculty, Bram Akkermans, Catalina Goanta and Sjoerd Claessens make introduction clips to replace pre-discussion sessions and feedback clips replace post-discussion sessions. The videos replace either an introduction of a new course or topic, providing theory or instruction. Other clips provide feedback on students' work, or on their PBL contributions. Usually the tutor makes the clip, but in some occasions they ask a (former) student or an expert. The feedback video is often used to deal with difficulties that emerge during the tutor sessions or mistakes students make in their assignments. These video can be of various formats and are usually less time consuming to produce than a knowledge clip. Formats used are pen-casts, vlogs designed as news programs.

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Student generated clips

A student generated clip can be used to replace a written assignment. Teacher Giselle Bosse, at Maastricht University of Arts and Social Sciences, asks students in her Civil Society and European Integration course to make a BBC style documentary in which they analyse an EU instrument. The video assignment includes conventional learning goals, such as knowledge acquisition and application, well-argued empirical analyses, knowledge dissemination, team work and problem solving skills. In addition, students improve their ICT, new media and presentation skills. This assignment truly motivates the students and is now one of the assignments they spend most time and energy on.

Another example of a student generated clip is one where a student demonstrates a skill or practices a patient conversation with a simulation patient played by another student or professional actor. This format is often used at medicine and psychology courses. Afterwards the students watch themselves and each other and provide and receive peer and teacher feedback attached to the video fragments (Sandra Mulkens, 2015).

Experiential video

An experiential video can bring the outside world into the classroom. Roy Erkens, who teaches tropical ecology at Maastricht University, brings his fieldwork in the jungle of Cameroon back to his. Doing so enables him to share an experience a book could not convey; students get a better impression of certain aspects of a professional career and at the same time he can demonstrate skills such as the collection and preparation of tropical flowers. He uses his i-phone, a selfie stick, and a small tripod. It is not a professional production, but the sound is good and it allows him to capture interesting moments as they occur.

Fictional clip or film

Some of the interviewees used a fictional story to introduce a new topic. For instance, Lorenzo Squintani and his colleagues (Groningen University) acted out sketches to illustrate the effects of a European law on everyday life. They chose to act out the roles themselves, as they felt a content expert would be better at conveying the message. Bas Haring, of Leiden University made a series of professionally produced short films for a course on ethics, called: *On being a scientist* (van Ginkel, 2016). Each episode presented a different issue that formed the bases for the face-to-face session. The objective is to make theory personal and/or tangible. The videos are a replacement of short novels. He argues professional actors are crucial for a convincing video.

Good practices in video design

Utrecht University uses a viewing guide, by Liesbeth Kester (2013), for assessing educational video on design and content. Her guide is based on the cognitive load theory by Richard Mayer (1998). The guide explains that video is of high educational value when it captures the attention and enables to select information and process it in our working memory, and when it activates relevant existing knowledge. According to media principles relating to sensory receptors and memory work load, a video is most effective when learning goals are defined in

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the beginning, the video is short, 2 to 5 minutes, covers 1 topic, and uses images and sound rather than long texts.

Effective multimedia design principles for video design:

1. *Multiple representations* – use both text and images;
2. *Contiguity* – present text and images simultaneously and next to each other;
3. *Coherence* – only use related material;
4. *Modality* – use audio rather than written texts;
5. *Redundancy* – spoken text does not need to be repeated in writing;
6. *Segmentation* – cut information into meaningful segments.

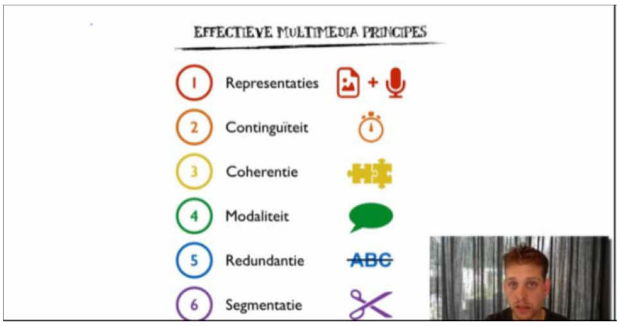

Figure 3. Still Don Zuiderman (2014) media principles

Learning materials that follow these principles respect the affordances and limitations of the working memory; hence it will be processed more efficiently and stored in the long term memory (Zuiderman, 2014).

Good practices in production

Pre- and post-production

Minimizing expensive post-production by maximizing pre-production was typically done by universities that have a high video production output, and therefore more to gain from a maximization of the production efficiency (i.e. Delft, Erasmus and Wageningen).

Scripting

To reduce studio time, a number of universities only grant teachers studio access after receiving a script or slides (if used). Moreover, they have a specialized eLearning or Videoteam that "cleans" the slides (e.g. Wageningen, Erasmus, Delft). Han Smolenaars (June 13, 2016) of Wageningen University adds that linking a script to a video facilitates content search of video fragments.

Pre-produced formats

To speed up and simplify production, a few universities use pre-produced formats. The studio technicians at Erasmus use a standard layout for all knowledge clips (Pieter van Baarle, June 2, 2016). The Universidad Politécnica de Valencia features three studios each set up distinctly to

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produce a certain format. Teachers walk into the studio with the format they need. This save time and money and lowers the threshold for teachers.

DIY studios

A number of Dutch institutes have *do-it-yourself* (DIY) studios to increase accessibility for less tech savvy teachers, at relatively low cost. The cost of a DIY studio varies from €4.000 (Zuyd University) to €10.000 (Utrecht University). A typical DIY studio features a computer, a camera and a desk with a green screen and/or white board and ideally a form of AV-support in the vicinity. Teachers can reserve, walk into, record and walk out of the studio. Interviewees that DIY studios effectively lower the threshold for teachers.

Production quality

There are significant differences in terms of video production process, format and quality. Where Delft University has a team of about seven people involved in their professional video productions (Danika Marquis, April 6, 2016), others use do-it-yourself studios (e.g. UU, HSZuyd, Erasmus), webcams or smart phone. According to many interviewees, high production is not a prerequisite for success. High-quality audio, however, is considered crucial. Students happily watch webcasts or films made with a smart phone, if the content is strong. In addition, students appreciate authenticity (Danika Marquis, April 6, 2016).

Copyright and image right

The decision to show videos online impacts copyright rules and regulations differently. Particularly institutes that offer open and online video content, such as Delft, Wageningen, and Zuyd University, have a protocol for addressing copyright in place. At Zuyd University, librarians scan videos for copyrights (Els Koelewijn, February 4, 2016) and at Delft University, the media centre does the same (Danika Marquis, April 6, 2016). Delft University has a policy: *use creative commons unless*. Hanze University of Applied Sciences, provides its staff with copyright guidelines and information.

Good practices in support

Support staff and teachers that were interviewed, stress that the importance of relieving teaching staff from supportive tasks so they can focus on teaching. At Erasmus University Rotterdam support is provided by a centralised AV-support team and by faculty level eLearning teams. At Wageningen, Hanze, Zuyd, InHolland, KULeuven the eLearning teams and didactical support is also centralized.

In the design phase, multimedia design staff can help design a video, choose the right format and align the video(s) with learning goals.

- In the *production phase,* AV staff, editing staff, and copy right specialists can be of support.
- In the *publication phase,* a so-called key user can assist in uploading to the platform, organizing folders, granting access, linking to the learning management system.

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Training

Providing training for teaching staff can be viewed as a form of support. At Wageningen University, teachers are asked to follow training before using of the studio.

- *Presentation skills.* Presenting in front of a camera is quite different from lecturing face-to-face. Most interviewees say that even reluctant teachers are convinced of the added value of a presentation training once they have taking it. As an added bonus, it helps improve the "traditional" lectures.
- *Multimedia course design.* This stimulates teachers to rethink their existing course content and teaching methods. Some universities offer even a more focused training. For instance, Utrecht University offers a knowledge clip workshop.
- *Editing and other technical skills.* These training sessions that are aimed at a hands on teaching of an editing tool often offer components of multimedia course design and video design as in many cases the participant is inexperienced in the entire process of making a clip.
- *A tailor made mix of training and support.* At Groningen University a teacher who wants to use video receives 20 hours (usually five sessions of four hours) of support of a pedagogical expert specialized in multimedia curriculum design. Together with the teacher learning goals are determined and course and videos are designed. The teacher is rewarded with a University Teaching Qualification.
- *Best practices events and social media groups.* Interviewee Koos Winnips (Groningen University) runs a LinkedIn interest group for teachers from both Hanze University of Applied Sciences and Groningen University to share experiences and best practices with video and flipping the classroom. In addition, he organizes events to exchange practices.
- *Teacher feedback.* Some universities try to promote peer support among teachers by developing online training tools that allow teachers to share their clips and provide feedback.

Conclusion

Video can be a great tool for moving toward a blended learning model. The most important take away in terms of didactics, is that video is only successful if aligned with learning goals and activities. However, it is important to realise that video is a costly and time consuming process. Institutes, who choose to promote the use of videos among their teaching staff, are more likely to succeed if carefully plan how spend their investments of time and money. They may lower the threshold for teachers wanting to embed video by relieving teachers from supportive tasks by providing sufficient and effective support. The practices presented in this paper are aimed at inspiring teachers and curriculum designers and at providing input for the discussion on the development of video support facilities that best fit the needs of the institute, its' students and staff.

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Appendix

List of interviewees per institute

Erasmus University (problem based at 4 faculties, including LAW; thematic learning at medical faculty; traditional lectures at RSM)

- Bas Giesbers, information management- e-learning team, Rotterdam School of Management (RSM) (April 1, 2016)
- Farshida Zafar, teacher and member learning team, Erasmus School of Law (ELS) (April 4, 2016) PBL
- Sorosh Shams, functioneel beheerder at Erasmus School of Law (ELS) (June 2, 2016)
- Mary Dankbaar, Program manager e-learning at Erasmus Medical Centre (April 8, 2016)
- Pieter van Baarle, studio and media support center (June 2, 2016)

Hanze Hogeschool (thematic learning)

- Ilonka Hebels, teacher (Communications Media and IT) (April 8, 2016)

Zuyd University of applies Sciences (problem based, project based, cased based and other collaborative learning models)

- Alexandra Montague and Luisa Arrivillaga, teachers (Spanish/Portuguese) (March 3, 2016)
- Els Koelewijn, project leader blended learning program (February 4, 2016)
- Frans Roovers, teacher Social Work and student career counsellor (February 17, 2016)
- Inge van Putten, teacher Chemical Technology (February 29, 2016)
- Pieter Dekker, instructional media developer (February 17, 2016)

Hogeschool Utrecht

- Don Zuyderman, knowledge clip on video design (YouTube posted on January 23, 2015)

InHolland (project based learning)

- Zac Woolfitt, Teacher Tourism department CROHO and member of Research group teaching and technology (April 4, 2016)
- Jos Fransen, Lector Teaching, Learning and Technology (presentation at preconference Media and Learning (March 17, 2016)

Catholic University of Leuven (social constructivist learning – no single centralised method)

- Mariet Vriens, (April 14, 2016)
- René Hermens, Educational Technologist- Education Research and Support (March 29, 2016)

Groningen University (no single centralised method)

- Koos Winnips, Educational Support and Innovation & BKO (March 3, 2016)
- Dr. Lorenzo Squintani, Teacher Faculty of Law (April 5 and 7, 2016)

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Delft University (traditional, lecturers have great autonomy, blended learning models, online learning in extension school)

- Danika Marquis, eLearning and Video Support (April 6, 2016)

University Leiden (no single centralised method)

- Bas Haring, Associate Professor Leiden University- Leiden Institute of Advanced Computer Science (LIAC) – Presentation Sneak Preview "The Scientist" at SURF (March 11, 2016)

Tilburg University (lectures and collaborative group work)

- Esther Breuker, Academic Support Teacher development & Project manager Media & (E)-learning (April 4, 2016)

Utrecht University (activating collaborative methods)

- Liesbeth van de Grint, Educational Advisor and Training – Centre for education and Learning faculty of Social Sciences (February 1, 2016)

UvA (no single centralised method)

- Werner Degger, AV support (March 1, 2016)

Wageningen University (lectures in combination with collaborative work forms, was PBL in the nineties)

- Dennis Anneveldt, media Specialist (June 13, 2016)
- Han Smolenaars, Educational Staff Development (June 13, 2016)

University of Maryland (lectures combined with collaborative work forms)

- Mary Lynn McPherson, PharmD, MA, BCPS Professor and Vice Chair – Department of Pharmacy Practice and Science mmcphers@rx.umaryland.edu (November 10, 2015)

Maastricht University

Faculty of Arts and Social Sciences – FASoS

- Emilie Sitzia, (May 24, 2016)
- Carine Germond, (June 3, 2016)
- Giselle Bosse, (May 12, 2016)
- Marjolein van Asselt, (June 20, 2016)
- Saeed Parto, (May 11, 2016)

Faculty of Health Medicine and Life Sciences – FHML

- Nynke de Jong, (February 5, 2016)
- Danielle Verstegen, (May 19, 2016)
- Lianne Loosveld, (February 22, 2016)
- Monique Kenstra, (June 28, 2016)
- Carijn Beumer, (May 25, 2016)

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Faculty of Humanities and Sciences – FHS

FHS – Science Programme

- Roy Erkens, (June 12, 2016)

FHS – University College Maastricht

- Mark Stout, Kai Heidemann and Jeroen Moes, (April 21, 2016)

Faculty of Law – LAW

- Bram Akkermans and Catalina Goanta, (May 30, 2016)
- Aalt-Willem Heringa, (May 24, 2016)
- Sander Jansen, (May 31, 2016)
- Sjoerd Claessens, (April 8, 2016)

Faculty of Psychology and Neuroscience – FPN

- Margje van de Wiel and Herco Fonteijn, (March 10, 2016, workshop BKO PBL course design)
- Michael Capalbo, (February 22, 2016)
- Sandra Mulkens, (April 7, 2016)

School of Business and Economics – SBE

- Jaap Bos, (February 22, 2016)
- Sjoke Merk, (April 1, 2016)

Maastricht University Office – MUO

- Annabel Reker, (May 15, 2016)

Science Vision

- Ger van Wunnik, (March 16, 2016)

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POLICY REVIEW OF OPEN BADGES FOR OPEN EDUCATION: WHAT DOES IT TAKE TO SCALE UP OPEN DIGITAL CREDENTIALS?

Ilona Buchem, Beuth University of Applied Sciences Berlin, Germany

Summary

The Internet and digital media have created unprecedented opportunities to connect, communicate and learn. In the digital age learners have abundant and diverse possibilities to engage in open learning in order to reach their personal, social, academic and work-related goals. Open learners can participate in open courses (e.g. MOOCs) and use open resources (OER) but they also need tools to recognise and communicate their open learning achievements on the web. Open credentials supported by open badges help learners aggregate learning achievements and evidence of learning from multiple sources in a portable, shareable and verifiable format. This policy review focuses on the question of how to scale up the adoption of open badges as building blocks of open education and open learning with the aims of capturing, recognising and communicating open learning achievements, such as acquired skills and competencies, across contexts and systems. The review builds on the discussion paper titled "Establishing Open Badges at Policy Level" published as one of the outputs of the Erasmus+ strategic partnership "Open Badge Network". The review summarises key policy research findings and formulates policy recommendations for scaling-up the adoption of open, digital credentials in Europe and beyond.

Introduction

Improving assessment, recognition and validation of a full range of learning taking place in diverse learning contexts is one of the key challenges worldwide and is central to achieving education-related Millennium Development Goals (MDGs) and the objectives of the Education 2030 Framework for Action (FFA). The FFA reaffirms the vision of the worldwide movement for Education for All and sets out a new vision for education for the next fifteen years (UNESCO, 2016). UNESCO, UNICEF, the World Bank, UNFPA, UNDP, UN Women, UNHCR and other organisations have expressed their commitment to the Sustainable Development Goal 4 (http://www.un.org/sustainabledevelopment/education): "Ensure inclusive and quality education for all and promote lifelong learning" including "the provision of flexible learning pathways, as well as the recognition, validation and accreditation of the knowledge, skills and competencies acquired through non-formal and informal education" (UNESCO, 2016). Recognition of learning is considered as a key dimension of open education as proposed in the recent report by the European Commission's Joint Research Centre (JRC): "Opening up Education: A Support Framework for Higher Education Institutions". Much has been undertaken in Europe to enhance recognition of learning in the recent years. A large number of frameworks and tools have been designed to support description, recognition and documentation of learning outcomes. This includes the Europass instruments, European and National Qualification Frameworks, ECTS (European Credit Transfer and Accumulation System), ECVET (the European Credit System for Vocational Education and Training) and recently ESCO (European Skills, Competences, Qualifications and Occupations).

However, despite the numerous frameworks and tools, a common technology which would allow to describe, recognise, validate and communicate learning outcomes from and across multiple contexts, experiences, interactions, environments and systems – thus taking into account how learning happens today, in the digital age – has not been established yet. Especially in context of open education, a policy response is missing about how learners can have their open learning outcomes effectively recognised and validated and share them on digital media to unlock new opportunities for education, employment, collaboration and self-development.

A technology capable of supporting such open, digital credentialing is the Mozilla Open Badge Infrastructure (OBI). OBI is an interoperable, open source technology which supports recognition, validation and communication of learning outcomes. Open badges as elements of the OBI have been used as open, digital credentials to recognise learning achievements and visualise learning pathways. Open badges can be easily shared by learners across the web. Schools, universities, employers and informal learning providers globally are already using open badges to capture life-long and life-wide learning which might have been unrecognised before. Open badges are also a global community of practice engaged in rethinking and transforming credentialing practices in line with the worldwide movement for open education.

This policy review focuses on the question of how to scale up the use of open badges as building blocks of Open Education aiming at capturing, recognising and communicating open learning across contexts. The review builds on the discussion paper titled "Establishing Open Badges at Policy Level" published in July 2016 as one of the outputs of the Erasmus+ strategic partnership "Open Badge Network" (http://openbadgenetwork.com) (Buchem, van den Broek, & Lloyd, 2016). The review presented in this paper starts with the background information about open badges, the Open Badge Network project and the rationale for policy support for open credentialing. It then presents research questions, methodology and selected results from policy research conducted with policy makers in Europe. Finally, the review formulates policy recommendations for scaling up the adoption of open credentials in Europe and beyond.

Background and rationale

The Internet and digital media have created unprecedented opportunities to connect, communicate and learn. In the digital age learners have abundant and diverse possibilities to engage in open learning in order to reach their personal, social, academic and work-related

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goals. Open learners can participate in open courses (e.g. MOOCs) and use open resources (OER), but they also need tools to recognise and communicate their open learning achievements on the web. Open credentials supported by open badges help learners to aggregate learning achievements and evidence of learning from multiple sources in a portable, shareable and verifiable format. Open Badges are based on an open standard developed by Mozilla and have been specifically designed to be used as digital tokens or markers of learning and accomplishment (Casilli & Knight, 2012). Every open badge contains metadata about the learner, the badge description, the issuing organisation, the date it was issued, criteria defined as necessary to earn the badge, the web address that links to evidence and other information. The metadata travel with the badge once it is issued thus making it possible to process and recognise each open badge outside the issuing system (Grant, 2014). In this way, open badges enable representation, verification, and communication of skills and knowledge acquired in any digital and non-digital learning environment. Open badges have been used in many different ways, e. g. (a) to recognise skills, achievements, memberships, engagement, (b) to assess learning through summative and formative assessment, (c) to motivate learners, (d) to provide orientation through setting and visualising learning goals and tasks, and (e) to study learning based on the information contained in open badges (Casilli & Hickey, 2016).

Open badges have been supported by a number of initiatives and organisations around the world, most notably the Mozilla Foundation and the MacArthur Foundation (http://openbadges.org), the Badge Alliance (http://www.badgealliance.org/about) and the IMS Global in the USA (https://www.imsglobal.org/pressreleases/pr150421.html). In Europe, the Open Badge Network (OBN – http://www.openbadgenetwork.com) – a strategic partnership founded by the Erasmus+ program – has been dedicated to promoting open badges as a way to recognise life-long and life-wide learning. One of the key endeavours of the Open Badge Network is to formulate policy recommendations for open, digital credentialing with open badges to enhance recognition and validation of diverse forms of learning. Recognition and validation of non-formal and informal learning is one of the key topics in the European Agenda for modernising (higher) education (Cedefop, 2015). The recommendation of the European Council 2012 calls for European cooperation in validation of non-formal and informal learning and national arrangements "allowing individuals to value and make visible the outcomes of learning at work, at home, during leisure time and in voluntary activities" (Cedefop, 2015). The European Guidelines for Validating Non-formal and Informal Learning published by Cedefop in 2015 recognise validation as an important element of national policies on education, training and employment and emphasise the bridging character of validation. Also, the EC JRC 2016 report titled "Validation of non-formal MOOC-based learning: An Analysis of Assessment and Recognition Practices in Europe (OpenCred)" addresses digital credentialing with open badges and concludes that recognition of open learning is a key issue for policy development in view of the continuing rise of MOOCs and other forms of open education (Witthaus et al., 2016).

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The policy recommendations in the Erasmus+ Open Badge Network build on policy approaches which address the changing landscape of education and credentialing in the digital age. The first discussion paper titled "Establishing Open Badges at Policy Level", published in July 2016, emphasises the need for cooperation of key stakeholders and a harmonisation of a diversity of views and approaches related to the modernisation of educational credentialing and its progression towards open, digital credentialing (Buchem, van den Broek, & Lloyd, 2016). The OBN policy paper encompasses the results of the first cycle of policy recommendations. The forthcoming white paper will use key discussion strands and responses to the fist publication to advance policy recommendations as part of the second cycle in 2017. Following up on the first OBN paper, the policy review presented here summarises key policy research finding and formulates policy recommendations for scaling-up the adoption of open, digital credentialing practices in Europe and beyond.

Research questions and methodology

Educational credentialing is a phenomenon which can be looked at from different perspectives, including economy, sociology and psychology (Buchem, van den Broek, & Lloyd, 2016). From an economic perspective, educational credentials fulfil a signalling function: Job-seekers select credentials as signals to maximise their employment opportunities and employers interprets the credentials of job-seekers as signals to distinguish one applicant from the other thus narrowing the information gap (Spence, 1973). From a sociological perspective, educational credentials contribute to the emergence of status groups, stratification of occupational and educational pathways and the development of credentialing markets controlling entry barriers to employment (Brown, 2001). From a psychological perspective, educational credentials play an important role in personal management and recruitment practices, especially as predictors of future work performance (Buon & Compton, 1990). Open badges provide a chance to rethink educational credentialing, posing such questions as:

- What should be recognised as learning in the digital age, in which learning takes place anywhere, anytime, on any device and in connection to anyone on the planet?
- Which methods are appropriate to recognise and make learning visible in times of increased personal responsibility for career development (employability) and flexibility of work (mobility)?
- What type of a social and technical system and tools for assessing learning, issuing, receiving and sharing credentials across contexts and environments are helpful in the digital age?

The key question of the policy research conducted in the Erasmus+ Open Badge Network (OBN) in relation to the policy dimension was how open badges as instruments of open, digital credentialing are perceived by policy-makers, especially if and how open badges may be used to recognise and validate (open) learning.

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The methodology of policy research conducted in the Open Badge Network project encompasses (a) secondary research, such as policy reviews, collations any synthesis of existing policies and credentialing practices, and (b) primary research including online surveys and onsite consultations with selected policy makers. The results presented in this paper outline selected findings related to the aspect of scaling up the adoption of open badges. These results come from the primary research conducted in the first cycle. The following five research instruments were applied in the first half of 2016 to elicit the opinions of policy-makers:

1. European Policy Online Survey conducted with selected European policy makers at national and supranational levels (April – June 2016) – http://goo.gl/forms/aTMDhvHEyjEEbVbI2,
2. Germany Policy Online Survey focusing on establishing Open Badges at policy levels in Germany (March – April 2016) – http://goo.gl/forms/oM3EpotjtioGc3j52,
3. Consultations with representatives of the European Commission, DG EMPL in Brussels (May 2016),
4. Consultations with the Europass Working Group on Innovation (June 2016),
5. Consultations with the National Project Manager of PIAAC Italy, Programme for the International Assessment of Adult Competencies (July 2016).

Both online surveys, i.e. the European and the German policy survey were conducted using a similar set of questions developed jointly and iteratively within the Open Badge Network partnership. Two consultations, i.e. EC DG EMPL and the PIAAC consultations, were conducted as in-depth, semi-structured interviews with selected policy-makers using the set of question from the online surveys as an interview-guide. The Europass consultations were conducted in form of unstructured interviews to first develop a better understanding of the topic in focus, i.e. possible links between Europass instruments and Open Badges. All three consultations were conducted by different interviewers from altogether four OBN partner organisations. The online surveys were led by one partner organisation with other partner organisations contacting selected policy makers at the national level in the EU countries represented in the OBN partnership.

Findings and Synthesis

The European survey on policy recommendations for open badges was filled out by altogether 21 respondents representing different policy-making organisations from the following countries: Germany, Hungary, Italy, Netherlands, UK, Poland, Poland and Switzerland. There was one responded from South Africa, thus extending the reach of the survey. The German Online Survey was conducted as part of a master thesis at Beuth University of Applied Sciences Berlin with altogether 11 respondents from key policy making organisations including the Federal Ministry of the Interior (BMI), the Federal Institute for Vocational Education and Training (BIBB) and the German Institute for International Educational Research (DIPF). Respondents mostly represented organisations from the field of educational

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policy. Most respondents represented a governmental policy making organisation at a national level. The information about the respondents to both surveys is summarised in Table 1.

Table 1: Respondents to the two online surveys on policy recommendations for Open Badges

	European survey	German survey
Sample size	n = 21	n = 11
Organisation type*	Governmental – 30% Non-governmental – 25% Non-for-profit – 25%	Governmental – 64% Non-for-profit – 18% Non-governmental – 9%
Policy area	Education policy – 45% Research policy – 25% Employment policy – 15%	Vocational education policy – 36% Education and research policy – 27% Employment policy – 9%
Policy level*	National – 55% Communal – 25% Sectoral – 20% Global – 15% European – 10%	National – 91% European – 64% Regional – 36% Global – 36% Communal – 18%

*Multiple choice item

The collated results related to selected 3 out of 10 questions from both online surveys are outlined below:

(1) What is your view on the recognition of competencies in your country/region?

The answers show that the recognition of competencies in Europe differs depending on the country and context. There is a tendency towards a positive perception of recognition of learning in formal settings, followed by mediocre recognition in non-formal settings and a negative perception of recognition of learning in informal settings. The results are consistent in both online surveys, offering an interesting comparison of a European and a national perspective about the recognition of learning in different settings. This comparison shows that there may different perceptions in different countries, e. g. a somewhat better perception of recognition of learning in Germany. The results indicate that open credentialing with open badges aiming at enhancing the recognition of life-long and life-wide learning may be particularly useful in the area of *non-formal and informal learning* and that there is a need for harmonisation of recognition at the European level. It is important to notice that non-formal and informal learning make up for most of open learning (cf. three types of open learning by Witthaus et al., 2016; p.10, i.e. Open Universities, Massive Open Online Courses, and Open Educational Resources). The clustered results related to the perception of recognition of learning from both online surveys are summarised in Table 2.

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Table 2: Recognition of learning from the perspective of different policy-making organisations in Europe

	European survey	German survey
Formal: Recognition of learning in formal settings	good – 45% average – 40% poor – 15%	good – 73% average – 27% poor – 0%
Non-formal: Recognition of learning in non-formal settings	good – 5% average – 70% poor – 25%	good – 0% average – 64% poor – 36%
Informal: Recognition of learning in informal settings	good – 15% average – 30% poor – 55%	good – 9% average – 64% poor – 27%

Scale: 1 – 6 (1 *very good*, 6 *very poor*)
Clustered results: *good* (1 – 2), *mediocre* (3 – 4) and *poor* (5 – 6)

(2) How aware are you of Open Badges? Would you recommend Open Badges to other organisations?

The answers show that most respondents in the European survey are somewhat aware of open badges but are not sure how open badges can be used. Also a large part of respondents to the European survey are well aware of Open Badges and their use, while most respondents to the German survey are not aware of open badges at all (cf. Table 3). Despite the differences in the level of awareness, most respondents (72.5% on average) consider open badges as useful tools for recognition of learning, especially for groups at risk including refugees. These results indicate that there is a need for a policy response about how to scale up open credentialing to enhance recognition of learning, especially in view of Education for All including migrants, refugees and asylum-seekers.

Table 3: Awareness and perceived utility of Open Badges by policy-making organisations in Europe (OBN surveys 2016)

	European survey	German survey
Awareness of Open Badges	Not aware at all – 24% Aware, but not sure how to use – 38% Well aware and know how to use – 33% Other – 5%	Not aware at all – 55% Aware, but not sure how to use – 27% Well aware and know how to use – 18% Other – 0%
Useful for recognition of learning	yes (in general) – 90% yes (risk groups/refugees) – 86% no – 10%	yes (in general) – 55% yes (risk groups/refugees) – 73% no – 9%

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(3) What are your recommendations for establishing Open Badges as recognition instruments in Europe?

The policy recommendations from respondents to both survey mostly focus on intensifying communication, dissemination and research on open badges. Some example recommendations include:

- Make open badges official in the EU, make them vastly used by law or cooperation with popular services like social media networks.
- Create a link with the European Guidelines for validation of non formal and informal learning, as well as with national systems for validation of non formal and informal learning, link to existing regulations.
- Provide research-based evidence that Open Badges are a reliable predictor of competences.
- Gain political support and involve stakeholders and decision-makers to gain reputation and recognition.
- Win support of more educational institutions/organisations by advertising and providing information in the country's home language.
- Provide information for employers about the meaning of Open Badges, to make it possible for them to appreciate the skills represented by an applicant's Open Badge.
- Provide quality assurance and global quality standards.

The last point, quality assurance, has been addressed by policy makers as a dilemma. To quote one of the respondents: "For providers it is attractive to define their own criteria for badges (for example for the MOOCs); for learners and employers on the other hand, reliable and comparable systems would be desirable." These results indicate that there is a need for policy support in scaling up the adoption of open badges, especially through gaining support of key stakeholders in the area of education and employment, but also conducting research to provide the necessary evidence and harmonising efforts on quality assurance.

To complement the results from both online surveys, the results of onsite consultations with selected representatives of policy-making organisations are summarised in Table 4 below:

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Table 4: Recommendations for establishing Open Badges in Europe, results of the OBN policy consultations 2016

	Key policy recommendations for Open Badges
European Commission, DG EMPL	Link Open Badges to key EU instruments such as Europass, ESCO and EQF and NQFs, especially the description of Learning Outcomes (LO) linking to LO in the criteria field. Link to occupational standards and other definitions of competences in Open Badges.
Europass, Working Group on Innovation	Link Open Badges to the Europass next development in the area of "Personal Environment" which will include data verified by third parties like the endorsement feature of Open Badges. Develop an "Issuing Environment" built around ESCO and ECVET standards.
PIAAC, National Project Manager Italy	Invest a lot in communication, have a robust quality assurance and scientific foundation. Promote Open Badges to complete portfolios or CVs, especially for young people, refugees, and in general for the recognition and certification of non-formal and informal learning.

Conclusions and Implications

The following conclusions for scaling up the adoption of open badges as tools for open digital credentialing supporting the recognition of open learning, especially in non-formal and informal settings, are based on the results of the primary and secondary research in the Open Badges Network project (Policy Output).

Open credentialing based on open badges can help overcome some key challenges of the current educational credentialing systems, including: (a) a gap between what a credential represents and what can be performed – by providing evidence and endorsement attached to badges, (b) a problem of verification of the accuracy of a credential – by metadata embedded into each badge, and (c) discrepancies between educational credentialing and the world of work – by designing open badges to act as bridges between academic and business discourse.

The key policy implications for scaling up the adoption of open badges for open digital credentialing include:

- Policy response towards open digital credentialing is necessary to enhance recognition of open learning.
- European frameworks and standards, such as ESCO, EQF and Europass, should take open badges into account as instruments with a potential to accelerate the uptake and reach of own objectives.
- Policy support for research and development in the area of open digital credentialing systems is needed to advance current instruments and adjust them to European needs and

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concepts, such as the ESCO taxonomy of learning outcomes which can be integrated with open badges.

- European policy makers at national and supranational levels should support and promote open digital credentialing to continue increasing emphasis on competence-based learning and assessment.
- European policy makers should support and promote open digital credentialing to continue increasing emphasis on life-long and life-wide learning including the recognition of informal and non-formal learning.
- European policy makers should support and promote open digital credentialing for better socio-economic outcomes and equal opportunities in education and employment including migrants and refugees.
- European policy makers should support and promote open digital credentialing to enhance the availability of tools that assist understanding and comparison of skills, competencies and qualifications.

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OPEN EDUCATIONAL RESOURCES (OER): GUIDANCE FOR INSTITUTIONAL DECISION MAKERS IN DEVELOPING AN OER STRATEGY

Lisa Marie Blaschke, Carl von Ossietzky Universität Oldenburg, Germany

Summary

In the hope of reducing ever-rising educational costs, more universities are turning to open educational resources (OER) as a means of minimizing the financial burden on students. Although initially a transition to OER may seem like a quick economic fix for reducing costs and increasing resource accessibility, it brings with it a variety of multi-layered issues – e.g., copyright and intellectual property issues, OER quality, relevance and applicability, resistance from faculty and the publishing industry, and institutional degree of openness (D'Antoni & Savage, 2009; Wiley, 2010) – each of which need to be addressed before successfully implementing a full-scale OER solution. In addition, institutions need to weigh the degree of openness they choose to engage in, as well as consider the advantages and disadvantages of their approach. This paper will discuss definitions of openness and OER, the benefits and challenges of OER, and current OER implementation strategies, while presenting three case studies of distance education institutions that have adopted OER and a summary of best practices.

Literature Review

Lane (2009) identifies two defining factors of openness: free accessibility using the Internet and limited restriction in using resources, which includes free access to source code, no subscription or licensing fees, and little or no restrictions to copyright and licensing. Openness in education can exist in many forms: open access textbooks and publishing, open courseware, open source software (OSS), massive open online courses, open course design, open delivery, open research, open evaluation, reflection, and scholarship, and open policy (Weller, 2014; Conole & Weller, 2010). OER occupy "a middle ground, intersecting with open access, through open textbooks, and MOOCs, which can be seen as a subset of OERs" (Weller, 2014; p.85). The first definition of OER emerged from a UNESCO conference in 2002, which defined OER as "The open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes" (Hylén, 2009; para.6). In 2002, UNESCO further broadened that definition, stating that OER are "digitalized materials offered freely and openly to educators, students and independent learners to use and reuse for teaching, learning and research" (OECD, 2007; p.10). Hylén (2009) expanded on this definition further, categorizing materials as: learning content, tools, and implementation resources (para.7). Openness does not automatically equate to "free" or "no cost", and certain restrictions can apply to openness, e.g., in terms of content licensing (Hylén, 2009; para.10; Lane, 2009). The most common license is the Creative Commons license (n.d), which defines the level of openness that can be attached to a work; a simple description of types of OER permissions is Wiley's (2016) five R's of retain, reuse, revise, remix, and redistribute.

Motivating Factors for Pursuing an OER Strategy

De Langen (2013) classifies institutional motives for participating in OER into three categories: the public good motive, the efficiency motive, and the marketing motive. Other categories are innovation and pedagogy motives.

The Public Good Motive: Altruism and Policy. Due to its potential to provide free access to knowledge and to bridge significant digital, societal, and cultural divides, OER is well aligned with academic traditions of altruism (D'Antoni & Savage, 2009; Hylén, 2009; OECD, 2007). In addition, the use of OER can help reap social benefits such as "altruistic public service", boosting human capital through the sharing of knowledge and educational resources (Stacey, 2011). A decision to engage with OER for the public good can also be externally influenced by emerging governmental policies, such as recent decisions by the U.S. Department of Education and the EU requiring open licensing of tools/content using federal funds ("Dept. of Ed", 2015; European Commission, 2015).

The Efficiency Motive: Costs, ROI, Quality, and Student Retention. One of the most commonly cited reasons for moving to OER is the desire to reduce costs, namely textbook cost – although these costs can vary depending on national context (Hylén, 2009; Weller, 2014). Within the U.S., e.g., textbook costs are estimated to be up to 26% of the cost of a four-year degree (GAO, 2005, as cited in Weller, 2014). Senack (2015) suggests that implementing OER could save U.S. students more than a billion dollars annually, as well as generate a return on investment that is six times the initial investment. These cost savings could translate to more tuition income (Fischer et al., 2015), improved student retention (De los Arcos et al., 2014), lower content development costs, improved development and quality processes, and increased innovation (OECD, 2007; pp.11-12; D'Antoni, 2009; Pawlyshyn et al., 2013; Stacey, 2011).

The Marketing Motive: Branding and New Sales Channels. Adoption of OER can be a selling point for many institutions, and by showcasing their use of OER, institutions can better market and improve their brand and public image, as well as attract new students (D'Antoni, 2009; Stacey, 2011; Hylén, 2009; Weller, 2014, OECD, 2007). OER can also support generation of new revenue by giving institutions an opportunity to recruit and channel students into formal education (D'Antoni, 2009, Stacey, 2011; Weller, 2014). The OER Research Hub reports that 31.5% of informal learners see OER as an opportunity to test courses before paying; 24.2% state that they would pay for a course after using OER (De los Arcos et al., 2014).

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The Pedagogy Motive: Student-Centered Learning and Faculty Collaboration. Adopting OER can also lead to better teaching and learning practice; improved learning outcomes through more student-centred learning; fewer student failures; better retention; and higher course completion and pass rates (Pawlyshyn et al., 2013, Weller, 2014; Green, 2015; Fischer et al., 2015). Educators can also benefit from producing OER, e.g., through quicker distribution of research results to a wider audience, thus opening up opportunities for including others in quality assurance, idea development, and problem-solving (Hylén, 2009; Stacey, 2011; Pawlyshyn et al., 2013), and furthering boosting reflection on teaching practice (De los Arcos et al., 2014).

The Innovation Motive: The Fear of Being Left Behind. Although not yet mainstream in its adoption (Weller, 2014), OER adoption is a rising trend, and institutions that do not engage with OER run the risk of becoming "increasingly marginalised by market forces" (Hylén, 2009; para.28; OECD, 2007). According to Weller (2014), a move to OER can also support experimentation and innovation within the institution.

Strategies for Engaging in OER

In considering OER strategy, institutions need to decide upon the level to which they will engage with OERs. Weller (2014) describes these levels of OER engagement as: *primary OER usage* (extensive use of OER by educators, who are active proponents); *secondary OER usage* (used practically to support innovative educational approaches, with general awareness of OER licensing); and *tertiary OER usage* (little awareness of OER, which are primarily used for consumption). Another way of viewing level of engagement with OER is proposed by Wiley (2007), who describes these different types of OER reuse: as-is reuse; technical adaptations for reuse; linguistic adaptions for reuse; cultural adaptations for reuse; and pedagogical adaptations for reuse. The level to which institutions choose to engage with OER will strongly influence the type of funding model chosen, so a basic understanding of funding models for OER projects can be beneficial (see Hylén, 2009 for more information).

Challenges of implementing an OER initiative include limited sustainability of the business model; large start-up costs; reluctance of academics to use OER; difficulties in finding and embedding appropriate OER, e.g., due to non-interoperability of technology formats/platforms; poor OER quality; lack of awareness regarding copyright; inadequate institutional support and support infrastructure; absence of incentive; desire of publishers to retain control of the publishing sales channel; and difficulties in sustaining an OER strategy (Kortemeyer, 2013; Weller, 2014; Allen & Seaman, 2014; Green, 2015; D'Antoni & Savage, 2009; OECD, 2007; Wiley, 2007, 2016; Pawlyshyn et al., 2013; Downes, 2007; Hylén, 2009; Straumsheim, 2016; Jacobs, 2014; Senack, 2015).

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Methodology

The goal of this research was to identify potential issues and gather current strategic approaches from the field in managing and implementing an OER solution. Research questions addressed within this research were: (a) *What factors need to be considered when planning an OER strategy?* and (b) *What are best practices and critical success factors when implementing an OER strategy?* The primary research methodology used was a mix of standardized open-ended interviews, thus supporting comparisons across institutions and in-depth exploration of issues, strategies, and best practices (Cohen, Manion, & Morrison, 2008; Morgan, 2014; Willis, 2008). Interviews were with individuals responsible for developing and implementing strategies for OER at three distance education universities: Director of Multi-Platform Broadcasting at the Open University United Kingdom; Dean of the University of Maryland University College Undergraduate School (USA); and the UNESCO and Commonwealth of Learning OER Chair at Athabasca University, Canada. Interviews were fully transcribed; emerging themes and strategies were clustered, contextualized, and summarized (Gordon, 1992; Saldana, 2009; King & Horrocks, 2010).

Results

Three interviews from 30-60 minutes each were held from January to February 2016. Over-arching themes were identified: implementation strategies, reasons for and benefits of OER, challenges, and critical success factors. The Implementation Strategies theme includes approaches used by institutional leaders for developing and realizing strategies for implementing OER within their organizations. Reasons for Choosing OER and Benefits of OER were the next themes and are closely related, but with important differences, as a benefit sometimes emerged after the choice was made and did not contribute to the decision-making process. Challenges were those events that have made adaptation of OER difficult for the institution and key stakeholders. Critical Success Factors were the elements identified as those contributing to the overall success of the OER initiative. The following sections summarize the results of each interview surrounding these themes.

Athabasca University (Canada): http://www.athabascau.ca

Founded in 1972, Athabasca University (AU) is a leading online and open university located in Canada and since 2010 has been the host of UNESCO's OECD and Commonwealth of Learning Chair in OER (UNESCO, 1995-2010). AU's early involvement in OER dates back to the 1990s, when a decision was made to use openly licensed course materials for its mobile learning course offerings, in order to avoid potential legal issues due to copyright infringement of commercial content. The AU engaged more deeply with the OER movement after ACCESS Copyright, a Canadian copyright collective, increased its fees for students using its resources from $3.38 per student to $45.00 (Ives & Pringle, 2013). Open education and OER align closely with the AU's open admissions policy and its institutional mission (Ives & Pringle, 2013), and AU has traditionally been a proponent of OER, e.g., through its open access Athabasca University Press (http://www.aupress.ca), its use of open source software

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(Moodle), and more recently the establishment of its Open Library at AU (Stewart & Associates, 2006; Elliott & Fabbro, 2015). In adopting OER, the institution saw an opportunity to lower costs and develop and deliver courses more quickly, as well as to increase student motivation and retention rates (Ives & Pringle, 2013). AU has not made an official decision to apply a specific strategy for transitioning to OER; however, executive decision-making about open access and OER use indicates committed support of OER at AU, demonstrated through support of the OER Chair, the Open Library, and open access publishing.

The institution produces OER using "teams of learning designers, subject matter experts, visual designers, and programmers", who produce OERs such as "podcasts, interactive tutorials, crosswords, videos, visualization exercises, and multimedia learning objects", most of which have CC-BY licenses (Ives & Pringle, 2013; p.7). To help instructors prepare to OER, the institution provides OER examples and demonstrations as well as holds "a series of workshops and community conversations" both online and face-to-face (Ives & Pringle, 2013; p.8). OER that have been developed – from individual learning objects to complete courses – are stored in an open repository and given an open license. Success of the strategy is based on the number of OER that are used and prepared by faculty members, and awareness and promotion of OER success stories have been critical to AU's success in using OER (AU Interviewee, 2016). This awareness is also carried out by champions from a variety of disciplines within the institution, from the interviewee to course developers and executive management. As a next step toward realizing OER, the AU will be offering an online, first year program – completely OER – for students; at year-end, students can decide whether to apply for certification of learning (fee-based).

The AU Interviewee's advice for institutions contemplating a transition to OER is threefold: first, institutions need to create awareness for OER; second, provide incentives for faculty to adopt OER; and finally, install and support champions of OER within the organization. The AU has realized numerous benefits from using OER such as: reduced time for developing and producing courses; lowered costs of using commercial content; increased faculty collaboration (both within and outside of the institution); ability to easily adapt content to local needs; reduced dependency on the publishing industry and costs related to using commercial textbooks and sources; and student development and adaptation of own OER. Challenges in adopting OER at AU have included sustainability and funding of an OER approach; difficulties in adapting resources to the Canadian context; a lack of open courses (i.e., availability of the complete course package); and issues surrounding student fees and copyright. According to Ives and Pringle (2013), faculty reluctance to adopt OER has also been a challenge, as has a deficit in skills for incorporating OER into the curriculum. Also, Canadian copyright laws (specifically Fair Dealing rights) are quite open, allowing for extensive reuse of commercial content. As a result, faculty do not always see the value in using OER, since commercial content is readily available.

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University of Maryland University College (UMUC) Undergraduate School (USA): http://www.umuc.edu

In 2013, the decision was made by UMUC leadership to move to OER in an attempt to reduce student textbook costs. The movement to OER strongly aligns with UMUC's mission as an open admissions institution, one that focuses on student-centred learning and achieving specific learning outcomes that are aligned with industry need. As of fall 2015, all (over 700) of UMUC's undergraduate courses use embedded no-cost textbooks, and in fall 2016, all UMUC graduate courses also use 100% OER (Klein, 2015). The resulting savings is estimated "to be in the millions for the more than 80,000 students taking classes at UMUC annually" (Klein, 2015; para.3). Cini, UMUC Provost, estimates the savings in the "tens of millions of dollars" (Ludwig, 2015). A shift to OER ultimately reduced textbook costs for students, but also caused a rethinking of the educational approach to be more learner centered and has helped improve learning and performance (Klein, 2015; UMUC Interviewee, 2016). Other benefits of the transition were more flexibility in "switching out" resources, more sharing of resources, and a stronger focus on practical, competency-based learning outcomes that better align with workforce needs. As a result of its OER effort, UMUC was recently recognized by the Open Education Consortium (OEC) in realizing open-source education, receiving the 2015 OEC President's Award (Ludwig, 2015).

In transitioning to OER, UMUC built teams that consisted of: "a program chair, a faculty member or two, a librarian, and a member of the Design Solutions office" (Klein, 2015; para.14). The team-based approach helped ensure that responsibility of finding OER was not placed solely on individual faculty. Librarians and faculty searched for OER – often Creative Commons resources (Klein, 2015) – which would in turn be approved by the program chair. Working together with faculty and the program chair, a gap analysis would be performed, where missing content would be identified. Once suitable OER were found, content would be stored in an internal database (called Equella), and an instructional designer would prepare and incorporate these into courses, aligning the OER and content with learning outcomes. Program Chairs would then approve the redesign.

Factors in measuring success of the strategy include student satisfaction, student performance in terms of grades, and completion rates; OER were not found to have a negative impact on these factors. The next phase in the project will be a focus on improving measurement of student achievement of specific competencies and content effectiveness in supporting learning objectives. Factors contributing to project success were strong institutional leadership and support from management and stakeholders at all institutional levels. The UMUC Interviewee's (2016) advice for institutions considering OER is to involve faculty in the process, and to align the initiative with improvement of the student learning experience. One of the major challenges was in finding appropriate materials (Klein, 2015; para.20). Another challenge was that UMUC had no existing model to follow in making the transition. Initially, teams focused on searching for open textbooks, but soon found that this limited them in their ability to provide course content focused on learning outcomes and the focus quickly shifted

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to smaller chunks of OER; also, a large portion of the student population required offline/downloadable access to the resources, which was not an option with many of the open textbook offerings. It was faculty, particularly veteran teaching staff, who needed to readjust thinking about using free resources; newer staff did not have as many difficulties adjusting to the idea of OER (Klein, 2015). Issues around copyright and accessibility also arose, which were handled first by the library, then as needed by UMUC's legal department. This required that UMUC develop a feedback loop in resolving issues as they emerged. Project costs, mostly operational related to searching for and developing OER, also landed squarely on the institution.

The Open University United Kingdom (OUUK) (UK): http://www.open.ac.uk

The Open University (OUUK) is one of the largest providers of online education in the world and the foremost model of open learning institutions within distance education, prominently positioned as a leader within open education and OER. Shortly after MIT introduced its Open CourseWare project, the OUUK was approached by the Hewlett Foundation with an intriguing proposition: would they like to produce OER? Openness and access to education have always been critical to the OUUK mission from both a social and business standpoint, so providing OER was seen as contributing to the overall charter of the institution. Leadership also saw an opportunity to achieve scale by expanding OUUK market reach, as well as to participate in a potentially disruptive innovation. Having received substantial funding from Hewlett for the OER project, the institution made a strategic decision to set out on a journey to expand OER production and distribution and to more prominently position OER both within the institution and the field of online learning.

The Open Media Unit at the OUUK oversees a number of initiatives in support of open learning. Two of these are OpenLearn, which is the OUUK web portal to OER, and FutureLearn, which is the OUUK's open platform for delivering open online courses and supporting MOOC development and delivery. Content is provided using open source software (such as Moodle and Drupal) and platforms (such as Google Play, AudioBoom, Bibblio, and FutureLearn, an OU MOOC host). In implementing its OER strategy, the most senior support have been involved, as well as academics, production, IT, the strategy development unit, business development units (BDU), marketing, and the technology enhanced learning (TEL) unit. Stakeholder groups have played a critical role in contributing to the development of and evaluation of the program, e.g., in considering new pedagogical approaches, business models, market strategies, and uses of technology. As the OER project evolved, management saw the need for a policy that would define how OER would be positioned and used. The current policy (http://www.open.ac.uk/about/open-educational-resources/what-we-do/open-educational-media-operating-policy) defines purpose and types of open educational media within the context of the OU; guidelines for channels and for licensing; key performance indicators (KPIs); operating guidelines (content licensing); and guidelines for partnership and research projects. KPIs play a central role in measuring the success of the OUUK strategy, and a focus on aligning KPIs with institutional mission and

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strategy and measuring these meticulously has largely contributed to the project's success (OUUK Interviewee, 2016). Through its OER initiative, the OUUK has strongly positioned itself as a leader within the OER playing field: the MoocLab recently placed OpenLearn in first place in its international open courseware provider league table (2016). In realizing an OER project, the OUUK Interviewee identifies critical success factors such as strategically aligning the project with overall institutional strategy, building on institutional strengths and capacity, incorporating levers for motivation at all organizational levels, identifying clear values for measurement that are aligned with strategy, and engage senior-level and faculty support.

A variety of benefits of the OER project have emerged such as: improvement of the OUUK brand and reputation; expanded reach to new audiences; increased access; growing use of media assets through re-use of content and new technology enhancements; more partnerships; new business and process models; and growth of academic and business research opportunities. More informal learners are also being channelled into formal learning programs at an estimated 1,000 learners annually, thus increasing OUUK revenue. Revenues have also been achieved through the resale of courses to businesses who then repurpose them for individual use, as well as through a Google grant that "complements a commercial marketing budget" (OUUK Interviewee, 2016). Development of new, synergistic partnerships (such as training programs in Africa) and revaluation of established partnerships (such as delivery over the BBC) have also been realized, giving the OUUK competitive advantage through expanded brand awareness and recognition. Competitive advantage has also been realized by monetizing on the OER content by offering MOOCs through FutureLearn. In addition, the move to OER has caused a rethinking of business models, away from content and toward business processes, and has also led to a reimaging of the institutional brand as digitally savvy (OUUK Interviewee, 2016). A major challenge for the project has been in the provision of free OER and in licensing content, although the OUUK benefited from its existing institutional structure for addressing intellectual property and licensing issues. To limit commercial use of content, OER are offered under a Creative Commons CC-BY-NC-SA 4.0. Another initial challenges was the lack of an operational policy, which had the possibility of endangering sustainability of the project. This policy emerged as the project developed.

Discussion

Each institution in this research chose a different strategic approach, although all have a focus on growth. The AU strategy is an emergent, ad-hoc approach that is strongly influenced by external market forces, such as Canada's ACCESS Copyright and the Fair Dealing act. The strategy, albeit unofficial, is based on cooperation and collaborations (e.g., with the OERu), which are realized through the OECD/COL OER Chair based at the AU. AU also places a strong focus on improving processes and performance and on evolving with developments within the industry, as demonstrated through its ongoing adoption of open education practice. UMUC has also adopted a growth strategy, with a focus on achieving competitive advantage by further strengthening its position in the U.S. education market as one of the only institutions in higher education offering programs entirely based in OER. Its process in

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defining strategy has been emergent and influenced by customer needs, such as rising student costs and demand for low cost textbook solutions, and the strategy has evolved in alignment with educational industry developments in the U.S. The OUUK strategy can also be viewed as a growth strategy with a strong competitive dimension, as it explores new market opportunities through its OpenLearn and FutureLearn initiatives (market-based positioning). As with the AU and UMUC cases, the OUUK approach has emerged and evolved over time (e.g., in its development of an OER policy) and is based on its core competency as an open university. Institutional financial models also differ. While AU and UMUC rely entirely on institutional funds, the OUUK initiative is primarily funded through endowments and sponsorships (in addition to institutional funding). In all of the case studies presented, a combination of a bottom-up and top-down management approach was prevalent, which could be seen as a major contributing factor to the success of the OER initiatives and is also recommended in OER literature (Pawlyshyn et al., 2013; Stacey, 2013).

Key Elements/Best Practices in an OER Strategy

Before embarking on an OER strategy, an institution should assess its capacity for adopting OER, as well as decide upon its level of OER engagement and openness and its measurements of project success (Pawlyshyn et al., 2013; Weller, 2014). In the case of AU, the success of the initiative was based on the number of OER that were used and prepared by faculty members, while UMUC placed a stronger emphasis on student satisfaction, student performance in terms of grades, and completion rates, and is moving toward measuring the role of OER in supporting student achievement of competencies and learning outcomes. Measurements implemented by the OUUK centred on the conversion of informal learners to formal learners, brand impact, use and value of assets, and revenue income. As demonstrated in the research studies, the choice of measurement can differ based on the institutional approach to adopting OER, as well as on individual context. From the case studies and literature also emerged factors that contributed to OER success, such as executive management leadership and support; alignment of OER strategy with institutional mission and strategy; support and promotion of OER awareness and champions at all institutional levels; establishment of policies for OER management and measurement; incentives and motivational measures, e.g., by incorporating OER development into the tenure process and giving faculty control of intellectual property (Wiley, 2007; Weller, 2014; Jacobs, 2014; Stacey, 2011; D'Antoni, 2009; Friesen, 2009; Yuan et al., 2007; Downes, 2007; D'Antoni, 2009).

The following best practices emerged from the research, supported by the literature (De Langen, 2013; Pawlyshyn et al., 2013; Jung et al., 2016; Friesen 2009; D'Antoni, 2009; Weller, 2014):

- Promoting awareness for OER within the organization, e.g., through testimonials;
- Providing faculty incentives for adopting OER, e.g., by supporting attendance at OER conferences;
- Installing and supporting champions of OER within the organization;

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- Using design teams for identifying and incorporating OER and involving faculty in the process;
- Linking the OER initiative to improving the student learning experience;
- Aligning the project with overall institutional mission and strategy;
- Identifying institutional strengths that can contribute to the transition;
- Utilizing available resources such as existing frameworks and the library for evaluating OER content.

Conclusion

From the research presented here, it is clear that there are multiple and diverse benefits for institutions that choose to transition to OER, such as reduced costs, improved teaching and learning practices, greater accessibility to education, and improved learner outcomes. At the same time, the research also reveals real challenges faced by institutions embarking on an OER project, e.g., ability to locate appropriate OER, time and resource investments in adapting and embedding OER, and the costs of maintaining OER. A decision for or against using OER is highly contextual and influenced by a number of factors such as the overall institutional mission, values, and strategy, capacity of the institution to transition to OER (core strengths), external and internal forces, and the institutional motivation for choosing to adopt OER. Whether an OER initiative is successful and sustainable can be influenced by these factors, as well as by the degree of executive commitment and support, existence of institutional policy on OER, and the support infrastructure available for adopting OER. Each of these case studies, however, is a manifestation of how an OER venture can provide unique opportunities for optimizing business models, processes, and content according to individual institutional context and result in measurable benefits and value for the organization.

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MONITORING PROGRESS ON OPEN EDUCATION IN GERMANY

Ulf-Daniel Ehlers, Baden-Wurttemberg Cooperative State University, Germany

Summary

The paper summarises the situation of OER in Germany. An analysis of the scope of acceptance, use and implementation of the concept in educational institutions and policy, as well as an overview of the major actors and initiatives in the field of OER is presented. In addition, considerations about the concept of Open Educational Practices (OEP) and possible benefits for educational institutions are suggested.

Introduction to the Report

Open Educational Resources (OER) are meanwhile an introduced term in the field of education, research and (educational) policy in European countries and beyond. However, the scope of acceptance, use and implementation of the concept is varying strongly between countries. In this paper we attempt to utilize the method of a case study in order to describe the state of play of OER integration in educational practice and policy in Germany. We will show that Germany has raised a number of objections to the idea of OER. In an OECD survey in 2011 Germany – as the only OECD country – declared that OER were no priority issue for German education policy and would not be in the near future (Hylèn et al. 2012). In general, it is questioned whether a lack of digitally available content in Germany really hinders learning – this is debated particularly in the case of people with low qualifications – or, if it in fact truly presents a barrier for life-long learning in Germany, since access to (free and printed) learning materials is perceived as generally very good. Furthermore, it is debated if there are any sustainable business models for OER and suggested that there are unsolved questions of standards, quality, technical interoperability, and still open legal issues leading to risk of use of OER. In particular, the issue of copyright is widely discussed in Germany with reference to the ongoing Open Access debate. In Germany open educational resources have not yet reached the educational mainstream. However, a concerted statement of the federal government and the Lander (which are the 16 German states) was announced for late 2014 – and is still outstanding. Still a discussion about OER in Germany started in 2011 with the debate about the so-called “school-trojan”. The “school-trojan” project was based on an agreement between the education ministers of the Lander and the textbook publishers in order to infiltrate school computers, and allow searching school intranets and computer systems in schools for unlicensed teaching materials using a trojan spy software. The agreement was negotiated in 2011 and was then abandoned again due to strong protests from teachers, unions and open access activists in 2012 again. Although it seems that publishers abandoned the concept of

OER, in Germany campaigns and regional events were organized to emphasize the importance of OER (presented in chapter 2). Due to that several successful OER initiatives have developed in Germany (come of them presented in chapter 3). Open educational resources are also mentioned in official policy documents of the federal government, today (presented in chapter 4). Several publications and stocktaking activities about OER were initiated and research in that field was funded.

An authoritative definition of Open Educational Resources (OER) has not yet been agreed on. However, in this paper we follow the suggestion of the UNESCO International Institute for Educational Planning (IIEP) that OER include Open (Course) Content, Open Source development tools and Open Standards and licensing tools (International Institute for Educational Planning/ UNESCO, 2001). Open therefore means that the content (inclusive of meta data) is provided free of charge, that the content is liberally licensed for re-use, favourably free from restrictions to modify, combine and repurpose, that it is produced in an open format and designed for easy re-use and developed and hosted with open source software (Geser, 2007).

Although we seem to be on the verge of a changing landscape in Germany, and also other European countries, however, it is still an open question why OER still lack implementation on a large scale, also in Germany. Tony Bates suggested that the success of OER depend on building sharing cultures in organizations rather than access to technologies as main factor (Bates, 2015; also Ehlers, 2014). This is supported by the review of OER research since 2008 summarized below. It shows that the challenges associated with OER no longer emphasize solely on problems associated with availability or technological accessibility of resources but rather focus on usage, and on barriers of OER usage in the given educational setting or in the particular organisational culture. One could argue that the term OER – with its focus on the "R", the resources – constitutes a renaissance of the believe that in pedagogical scenarios content (resources) matters most. Research into the critical success factors of open education, however, show a different focus – it emphasizes:

- The focus on OER usage instead of the resources (Windle, Wharrad, McCormick, Laverty, & Taylor 2010; Philip, Lefoe, O'Reilly, & Parrish, 2008);
- The need for OER use skills (Beggan, 2009; Conole & Weller 2008);
- The importance of teaching skills and teaching culture and OER (Beggan, 2009)
- The necessity for OER quality frameworks and concepts specifically for open resources and open practices (Camilleri, Ehlers, & Pawlowski, 2014)
- The lack-of-transparency culture (McGill, Beetham, Falconer, & Littlejohn, 2008);
- OER assessment and recognition (Camilleri & Tannhaeuser, 2013; CHEA, 2014)
- The conflict between research and teaching excellence (Browne, Holding, Howell,& Rodway-Dyer, 2010);
- The shift from supply to demand side with OER (Browne et al., 2010; Beggan, 2009; McGill, Beetham, Falconer, &,Littlejohn, 2010);

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- Learning design as the pedagogical underpinning of OER (Kahle, 2008; Boyle & Cook, 2004).

OER in Germany: A chronology of main events

In November 2011 a meeting took place in form of a bar camp in Bielefeld, a small town in Germany, in which different actors signed a declaration of interest to disseminate the concept of OER in Germany more intensely. Afterwards an initiative was founded to harmonize the terminology of OER in the German speaking context and to organize the debate about challenges and chances in the field of OER. In addition, several smaller initiatives were launched, e.g. the blog cc-your-edu.de which provides information to interested teachers about the creative commons licenses. The first OER dedicated *OERCamp* took place in September 2012 in Bremen, Germany. In the summer of 2013 the first open online course on OER, *COER13* took place. In fall of the same year, the Wikimedia Foundation organized the first OER Conference in Berlin, Germany. First signs of a changed policy debate are today noticeable on federal as well on the Lander policy level. In Berlin the local government commissioned a study to find out the potential and distribution of OER on Berlin in comparison to the other Germany Lander. The study was carried out by the „Technology Foundation Berlin".

In November 2012 an expert meeting was organized between the federal ministry of education and research (BMBF) and the ministers conference of education ministers of the Lander (Kultusministerkonferenz) with the aim of stocktaking and defining the state of art of OER in Germany. All invited experts as well as the policy makers were agreeing that OER could be a meaningful complement to all other existing teaching and learning materials. Controversial discussions were led on the issue of quality assurance of OER and business models for OER development and distribution as well as issues around intellectual property rights. Representatives of publishing houses made a point that free access to teaching materials were putting their business under risk. Following the meeting, the conference of ministers of education was installing a workgroup on OER to put forward a position paper by 2015. In 2013 OER has been adopted into the coalition treaty on federal level of the then new coalition government of the Christian Democrat Party (CDU), the Christian Social Union (CSU) and the Social Democratic Party (SPD). It states „School books and teaching material... shall, as far as possible, be made available for free, the use of open licenses shall be extended." (CDU et al., 2013; pp.22-23)

In 2015 a report has been commissioned by the ministers of education of the German Federal Lander about OER (Bund/Länder AG, 2015). However, the report lacks conceptual vision in the sense that large parts of the eleven-page document only work out definitions, examples and history of the concept of OER and are not comprehensively summarizing the development of OER in Germany. In its most interesting part it suggests a way forward in six points which are interesting recommendations:

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1. Support the building up of platforms, registries and repositories to make available OER more easily and in target group specific formats.
2. To improve legal frameworks for sharing and reusing OERs on basis of the intellectual property rights.
3. To raise awareness for OER.
4. To inform better about OER.
5. To improve the European and international collaboration on OER.
6. To build coordination point and service desk for OER in schools and lifelong learning.

IN summary it can be stated that on a continuum from *open data*, via *open access*, then *open educational resources* (OER) and finally *open education* or *open educational practices* (for the term of OEP, see Conole & Ehlers, 2010), Germany has embraced the first two developments but has not come far (yet) with OER and OEP. In a major international research report called "Beyond OER", we concluded that OER in higher education institutions and schools in all European countries are available in principle, but are not frequently used (Ehlers et al., 2011). This is also true for OER in Germany. The cited study identifies the main barriers for using OERs: lack of institutional support, lack of technological tools for sharing and adapting resources, lack of skills and time of users, lack of quality or fitness of OER and personal issues like lack of trust and time (ibid.). While in Germany the federal government promotes an ICT policy, which aims at digitalization of higher education and schools, the development of OER policies is still in an early phase, if at all visible.

OER Initiatives in Germany

German schools and universities in general are very well equipped when it comes to textbooks and learning materials. In Germany, there are about 80 educational publishers that produce more than 3,000 new textbooks per year. In addition, while open access in science and research is well developed, scanning and copying books, remixing and e-mailing materials from commercial books are illegal in Germany. That creates a tension between schools and commercial publishers who in 2012 tried to launch an initiative to install a software application called "School-Trojan" to control forbidden digitalization in schools. The increased digitalization of society and new approaches to teaching have brought the global discussion about licensing teaching materials to Germany now more intensely. In Germany, too, there have been different initiatives in support of OER, a few are listed below:

Schulbuch-o-Matt (http://www.schulbuch-o-mat.de) is a national wide initiative by OER-Schul-E-Books to create collaborative free OER textbooks for schools, which are according to curriculum standards. It started in 2010. Crowd funding raises the money for the textbooks. Teachers, experts from university and graphic designer work together to produce the textbooks. They are free of charge for everybody. Since they are according to the curriculum of the particular federal state, the textbooks themselves are regional projects. The initiators of Schulbuch-O-Mat were mainly from universities. The project is also accompanied by an evaluation. So far two textbooks have been produced by OER-Schul-E-Books:

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- OER "Schul-E-Book Biologie" is a textbook for Biology for grades 7/8 of High Schools according to the curriculum of Berlin. It started in 2012 and was finished by the end of July 2013. The necessary budget was raised by crowd-funding till January 2013. The book itself was written by voluntary biology teachers and edited by professional graphic designers. The textbook is consistent with the curriculum (from 2006/2007) of Berlin for High Schools (Gymnasium) grades 7/8. It is the first free digital textbook in Germany under OER and CC license. The textbook itself is available as a webpage, and can be downloaded as pdf, ePub and iBook, and consists of multimedia courses with quizzes and exercises. Form and content is similar to a printed textbook, but it also includes interactive exercises, videos and pictures. The textbook is created with LOOP (Learning Object Online Platform), a free authoring software by the University Luebeck.
- OER "Schul-E-Book Politik/ Wirtschaft" is a collaboratively written textbook for grades 5/6 and 7 to 9 in secondary schools for politics and economy according to curriculum in North Rhine-Westphalia. The title of the first part of the planned series is "Securing and enhancing democracy". There will be two levels for different types of schools available. Form and content is similar to a printed textbook, but it also includes interactive exercises, videos, pictures, a glossary and an index. The last chapter is about different methods used in the subject like interviews, analyzing texts, pictures and cartoons, researching in the internet, designing a poster etc. It is an on-going process with the first part being finished in June 2014. The content is under the CC By-SA licence. The textbook is as well created with LOOP (Learning Object Online Platform).

Lehrer-Online (http://www.lehrer-online.de/lehrer-online.php), started in 2008, is a national platform for schools which was originally funded by the Federal Ministry of Education and Research. The main tasks of Lehrer-online are the provision of information and teaching material for schools (primary schools, secondary schools, vocational schools). New media for teaching and learning is a strong focus of the programme. Lehrer-online is part of the online network www.schulen-ans-netz.de, financed by the Federal Ministry of Education and Research (BMBF) and, in its first phase, sponsored by the Deutsche Telekom as well. Now it is led by the limited company Lehrer-Online GmbH. It is financed by advertisement and other services for the Federal Ministry or the ministries of the federal states. The material is still free for the schools. Most German federal states have now similar initiatives, e.g. Bavaria, Lower Saxony etc. The services of Lehrer-Online include: practical teaching modules including free-of-charge working materials, methodological and didactical articles and suggestions for classroom preparation, which have been developed and approved by teachers in the classroom and developed, researched and validated by editorial staff, both in terms of subject and methodology, before being published. Also a homepage generator for primary schools is available: Primolo is a net-based tool which can be used free of charge and which enables primary school children accompanied by a teacher to design their own web sites.

Learn:Line (http://www.learnline.schulministerium.nrw.de/app/suche_learnline/): This service provides OER material in line with the curriculum of North Rhine-Westphalia, the largest federal state in Germany. Material in the media-server learn:line is mainly OER and comes from different sources. It always states the copyright.

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Non-commercial organizations such as Wikimedia (http://www.wikimedia.de/wiki/OERde13) and Co:llaboratory (http://www.collaboratory.de/w/Hauptseite) are also great supporters of OER.

Most German OER platforms for schools are either small private initiatives or projects supported by federal educational ministries. In both cases, one can be sure that the people providing materials for the platform are activists who do it in their free time. The role of OER materials in schools up to secondary education is changing, the German concept remains to be seen, Norway, Finland, Poland and the Netherlands have already introduced OER in schools to support their educators.

Policies and Regulations Supporting OER

The various educational sectors – schools, vocational education and training, higher education and adult education – in Germany have a strong awareness of open access (OA) of digital materials. Research actors as well as the Federal Government and the Lander have initiated different activities to improve OA. The major research organizations and many institutions of higher education have OA policies. There are many institutional and discipline-specific repositories in Germany, which are maintained mostly by universities and research institutes. According to the registry of Open Access Repositories (ROAR), there are 167 OA institutional repositories in Germany. The German Initiative for Network Information (DINI) is supporting a national repository infrastructure. The Directory of Open Access Journals indexes 349 German Open Access journals. These journals are hosted by OA journal platforms, research institutions, and learning societies. Important German platforms which host OA Journals are: Copernicus Publications, Digital Peer Publishing NRW, German Medical Science, and Living Reviews.

The major research organizations (Max-Planck-Society, Leibniz Association, Fraunhofer Gesellschaft, Helmholtz Association) have Open Access policies. There is a general consensus to encourage OA publication in OA journals or depositing results and reports of research in Open Access repositories. The most important German funding agency, the German Research Foundation (DFG), has tied Open Access to its funding policy: Recipients of DFG-Funding are by default required to publish their research results digitally on the internet using an Open Access licence. The Federal Ministry of Education and Research (BMBF) plans to introduce a similar Open Access regulation for publicly funded research in Germany. A secondary publication right has been adopted recently to strengthen Open Access. It has been incorporated in the German copyright act. Now, scientists and researchers have the legal right to self-archive their publications on the internet, even if they have agreed to transfer all exploitation rights to their publisher. The regulation applies to results of mainly publicly funded research, twelve months after the first publication using the author's version. This right cannot be waived.

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An initiative to strengthen awareness and openness in access to digital research artefacts is the "Berlin Declaration on Open Access to Knowledge". The Berlin Declaration was initiated by the German Max-Planck-Society in 2003. The Berlin Declaration on Open Access to Knowledge has been signed by 53 German Institutions, including the largest research organizations as well as the German Rectors' Conference which represents 258 universities and other HE institutions. The DFG provides lump sums for covering publication costs including Open Access fees and also has a funding programme "Open Access Publizieren" by which universities can apply for funding in order to cover Open Access publication charges by university-based authors. Since 2010, the DFG financially has supported so-called "Alliance Licenses". In these concept publishers who publish journals under such (alliance) license permit German authors and their institutions to publish their articles apart from the respective journal also in Open Access repositories. Research organizations are funding Open Access publishing, and/ or have membership agreements with publishers on the central payment of publication fees for publications by their scientists in Open Access journals.

Within the BMBF-research programs the publication costs of research projects including Open Access may be funded. The open-access-platform provides detailed information about open access for scholars and other stakeholders. Moreover, information is presented from different user perspectives: authors, librarians, OA publishers, institutions running OA repositories.

While there is a strong awareness of Open Access, the term "Open Educational Resources" is not so well introduced, and even less familiar to the average German school teacher or university professor. The simplest reason for this is that there is no good equivalent term in German. Politically active teachers with a keen interest in technology are likely to pick up on the English "OER", however, the majority of teachers in schools and universities are not aware of the huge benefits of OER in their educational practice.

Indicators on openness in educational contexts

The German association „Digital Society“, the Austrian association „Free Networks“ and the Swiss association „Digital Allmende“ have initiated a project on measuring digital openness in 2013, called the Index of Digital Openness (http://www.do-index.org/idee-konzept/). The concept is based on three objectives:

1. A holistic indicator set is intended to capture a multitude of digital initiatives on openness.
2. A measurement of digital openness intends to provide indication about the entrepreneurs and the forerunners of digital openness.
3. A regular carried out ranking intends to provide a better possibility to compare the different initiatives and public efforts to progress on the issue of digital openness (do:index).

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The ranking is called [do:index], and is composed of five different parts which measure the contribution of different areas to the field of digital openness: data, information, knowledge, infrastructure as well as learning and teaching materials (OER). Collectively the rankings contain 60 different indicators in 97 questionnaires. The first data collection has been started in summer 2013. Results have been presented for the first time during the Re:publica-Conference in May 2014 in Berlin, Germany and are going to be updated continuously every year. In total 48 regions have been included in the survey in Germany, Austria and Switzerland. In Germany these are the 16 Lander and their capitals, as well as six further cities with more than 500.000 inhabitants (Dobusch & Palmetshofer, 2013). The ranking includes the issue of open education and aims to measure the policy objective to make education more freely available and comprises OER (Dobusch & Palmetshofer 2013; p.3). The OER questionnaire is composed of five categories: General information about OER, OER-Programs in educational institutions, licensing, lighthouse projects, and any further information. The following table (Table 1) shows the aggregated result in comparison of all 16 Lander of Germany.

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Table 1: OER Ranking

	Berlin	Brandenburg	Baden-Württemberg	Bayern	Bremen	Hamburg	Hessen	Mecklenburg-Vorpommern	Niedersachsen	Nordrhein-Westfalen	Rheinland-Pfalz	Saarland	Sachsen	Sachsen-Anhalt	Schleswig-Holstein	Thüringen
Are public authorities providing information about OER?	Yes	Yes	No	No	No	Yes	Yes	No	Yes	No	No	No	Yes	Yes	No	No
Land-specific Portal on OER exists?	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No
Public OER services?	Yes	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No
Public Certification Possibilities?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
OER Funding Programs available?	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No
OER part of Training programs for teachers?	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Public OER advocacy and campaign?	Yes	Yes	Yes	No	No	No	No	No	No	Yes	No	No	No	No	No	No
Member of OER associations?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Registered in OER policy register?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Teaching and learning materials without costs, reuse possible?	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Light-house OER projects?	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No
OER Coordination point existing?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Massive Open online Courses (MOOCs) supported?	No	Yes	No	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	No
# of positive replies	6	6	3	0	1	3	3	1	4	3	1	1	2	2	2	1

Summary and way forward

In Germany digital resources are in general available and accessible. The challenge is to move from digital resources to Open Educational Resources to Open Educational Practices (OEP). OEP needs to be supported more, in policy and in practice (Ehlers, 2011; Ehlers, 2014), in order to stimulate the (re)use and production of OER through institutional policies, promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning path (see also ICDE, 2013; Ehlers, 2013). This is especially crucial for

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Germany because although the general perception is that digital resources are available, availability is not use, and it can be seen that OER are not used frequently by educational professionals and not yet supported seriously in institutional policies. German educators therefore stand before the challenge to move from the focus on resources to a focus on using them, along with the respective open educational practices (OEP). In order to facilitate this shift from OER to OEP, it is important to provide more guidance and support to show how to deal with creation, assembly, use, sharing and reuse of OER for learners, educational professionals and organizational leaders. An additional challenge is to rethink the policies for publication and provision of teaching materials: Responsibility for education in Germany lies primarily with the federal states, and before materials can be offered to schools, teaching materials have to be approved by each federal state ministry. This is a difficult and lengthy process for non-commercial organizations, and so almost exclusively materials produced by commercial publishers are being approved at the moment. The entire approval system is based on the traditional publishing business model: a publisher develops a textbook, modifies it in accordance with a particular federal state's curriculum, gains approval from the relevant ministry, and ultimately offers it to schools after production. As a matter of fact, in many German federal states, schools are only allowed to spend their teaching materials budget on printed books.

To turn from a focus on resources to practices is also a turn from the notion of accessibility and availability to educational process and learning design. A look from the fields of the more general research debate to the country specific situation in Germany has shown that, in Germany, OER are relevant, also to the agenda of social and inclusion policies – and this is in line with other European countries (European Commission, 2013; European Commission, 2014). OER are supported by educational stakeholders, but their use in schools or higher education (HE) has not yet reached a critical threshold. This has to do with the fact that the past – and largely also the current – focus in OER in Germany is still mainly the emphasis on access to digital content and not its usage, and the creation of innovative and suitable educational scenarios.

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A PROGRAMMATIC APPROACH TO BLENDED LEARNING

Norman D. Vaughan, David Cloutier, Mount Royal University, Canada

Introduction

The idea of blending different learning experiences has been in existence since humans started thinking about teaching (Williams, 2003). The growing infusion of web-based technologies into the learning and teaching process brings this term into current consideration (Allen & Seaman, 2016). These technologies have created new opportunities for students to interact with their peers, teachers, and content.

Blended learning is often defined as the combination of face-to-face and online learning (Sharpe et al., 2006). Ron Bleed, the former Vice Chancellor of Information Technologies at Maricopa College, argues that this is not a sufficient definition for blended learning as it simply implies "bolting" technology onto a traditional course, using technology as an add-on to teach a difficult concept, or adding supplemental information. He suggests that blended learning should be viewed as an opportunity to redesign how courses are developed, scheduled, and delivered through a combination of physical and virtual instruction: "bricks and clicks" (Bleed, 2001). Joining the best features of in-class teaching with the best features of online learning that promote active, self-directed learning opportunities with added flexibility should be the goal of this redesigned approach (Littlejohn & Pegler, 2007). Garrison and Vaughan (2008) echo this sentiment when they state that "blended learning is the organic integration of thoughtfully selected and complementary face-to-face and online approaches and technologies" (p.148). A survey of e-learning activity by Arabasz, Boggs, and Baker (2003) found that 80 percent of all higher education institutions and 93 percent of doctoral institutions offer hybrid or blended learning courses.

Most of the recent definitions for blended courses indicate that this approach to learning offers potential for improving how we deal with content, social interaction, reflection, higher order thinking and problem solving, collaborative learning, and more authentic assessment in higher education potentially leading to a greater sense of student engagement (Norberg, Dziuban, & Moskal, 2011). Dziuban and Moskal (2013) further suggest that "blended learning has become an evolving, responsive, and dynamic process that in many respects is organic, defying all attempts at universal definition" (p.16). In this research study, the authors define blended learning as the intentional integration of theory into practice of classroom and field-based learning experiences through the use of digital technologies (Figure 1).

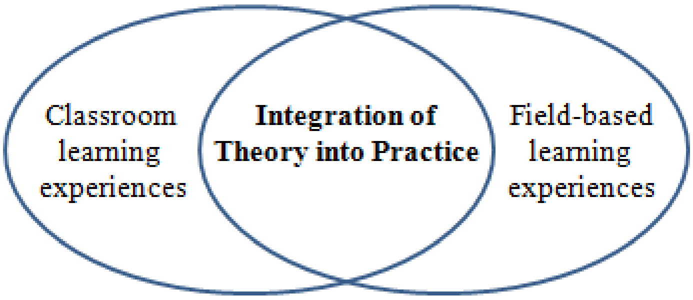

Figure 1. Bachelor of Education approach to blended learning

Study Context

Mount Royal University is a four- year undergraduate institution located in Calgary, Alberta, Canada (http://www.mtroyal.ca). In the fall of 2011, the University launched a new Bachelor of Education (B.Ed.) program, a four- year direct entry B.Ed. degree, with an emphasis on connecting theory with practice through early, consistent, and on-going field experiences (http://www.mtroyal.ca/bed). In the first two years of the program, students have a core education course each semester that meets once a week with a twenty- or thirty- hour field-placement. In the third and fourth years of the program, the students have extended field placements connected to program of studies courses and a capstone experience designed to integrate theory (of the coursework) and practice (of the field experiences). To facilitate opportunities for communication and reflection between the classroom and field-based learning experiences, the institution has adopted the use of *Google Applications* (http://google.mtroyal.ca): *Gmail* for communication; *Google Docs* (http://tinyurl.com/bedjournal) for reflective journaling; and *Google Sites* (http://tinyurl.com/bedportfolio) to construct a learning portfolio throughout the program.

This student-faculty research partnership study evaluates the effectiveness of the integration between the classroom and field-based learning experiences in this blended B.Ed. program from a student perspective, using the National Survey of Student Engagement (NSSE) framework (2011).

Theoretical Framework

The concept of student engagement has been discussed extensively in the educational research literature (Kuh et al., 2005). In 1998, the National Survey of Student Engagement (NSSE) was developed as a “lens to probe the quality of the student learning experience at American colleges and universities” (NSSE, 2011; p.3). The NSSE defines student engagement as the amount of time and effort that students put into their classroom studies that lead to experiences and outcomes that constitute student success, and the ways the institution allocates resources and organizes learning opportunities and services to induce students to participate in and benefit from such activities.

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These conceptions of student engagement in higher education are grounded in several decades of prior research, and particularly in four key antecedents: Pace's (1980) "quality of effort" concept, Astin's (1984) theory of student involvement, Chickering and Gamson's (1999) principles of good practice in undergraduate education, and Pascarella and Terenzini's (2005) causal model of learning and cognitive development. Based on this research and a meta-analysis of the literature related to student engagement, the NSSE has identified five clusters of effective educational practice. These benchmarks are (NSSE, 2011):

1. Student interactions with faculty members;
2. Active and collaborative learning;
3. Level of academic challenge;
4. Enriching educational experiences;
5. Supportive campus environment.

These five clusters of effective educational practice have been used to guide this action research study.

Methods of Investigation

An action research approach was used to direct this study. Stringer (2013) indicates that action research is a reflective process of progressive problem solving led by individuals working with others in teams or as a part of a 'community of inquiry' to improve the way they address issues and solve problems. This research approach should result in some practical outcome related to the lives or work of the participants, which in this case is the ongoing redesign of an effective blended B.Ed. program through the use of Kuh et al.'s (2015) assessment cycle.

Data Collection

Data was collected from the first graduating cohort of students from the B.Ed. program in partnership with four Undergraduate Student Research Assistants (USRA). The students in this study completed online surveys and participated in focus groups at the end of their first and fourth years in the program. The questions were derived from the National Survey of Student Engagement (NSSE, 2011) and *SurveyMonkey* was used to facilitate the online survey process. The student participation rate in these online surveys is summarized in Table 1.

Table 1: Online survey response rates

End of first year	End of fourth year
March 2012	April 2015
85% (77 of 91)	88% (57 of 65)

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Data analysis

A constant comparative approach was used to identify patterns, themes, and categories of analysis that "emerge out of the data rather than being imposed on them prior to data collection and analysis" (Patton, 1990; p.390). Descriptive statistics (e.g., frequencies, means, and standard deviations) were calculated for the online survey items using *MS Excel*. The additional comments and recommendations from the students were categorized in alignment with the five NSSE benchmarks in the *Google Document*.

Findings and Recommendations

The research findings and recommendations are summarized in relationship to each of the five NSSE benchmarks.

Student Interactions with Faculty Members

Students learn firsthand how experts think about and solve problems by interacting with faculty members inside and outside of the classroom. As a result, their teachers become role models, mentors, and guides for continuous, lifelong learning (Chickering & Gamson, 1999). One of the student participants commented in the fourth year online survey about the importance of "Having professors that were previously classroom teachers. I loved hearing their stories and experiences. I learned so much through personal stories" (Fourth year survey participant 17) and another student indicated "our Education professors modelled the qualities of exemplary teachers and responded to student need, tailoring the program to our feedback was amazing!" (Fourth year survey participant 33). Light (2001) highlights the importance of these previous sentiments, indicating that a close working relationship with at least one faculty member is the single most important factor in student success. A comparison of the first and fourth year online survey results suggest that students increased their frequency of communication with their teachers via email, as well as discussing grades or assignments, and working with faculty members on activities other than course work, outside of class time (Table 2).

Table 2: Student interactions with faculty members

Question	Student Response March 2012 Often/Very Often	Student Response April 2015 Often/Very Often
Used e-mail to communicate with an instructor	92%	96%
Discussed grades or assignments with an instructor	49%	54%
Worked with faculty members on activities other than coursework (committees, orientation, student life activities, etc.)	11%	21%
Discussed ideas from your readings or classes with faculty members outside of class	25%	25%
Received prompt feedback from faculty on your academic performance (written or oral)	78%	48%
Talked about career plans with a faculty member of advisor	38%	25%
Worked on a research project with a faculty member outside of course or program requirements	24% (plan to do in the future)	19%

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Unfortunately, the graduating students perceived in their fourth year that they were not as frequently receiving prompt feedback from their teachers, talking about career plans with a faculty member or advisor, or working on research projects with faculty members outside of class time. For example, there were several comments about the lack of timely assessment feedback and clarity of assignments. "Assessment feedback for many classes was not timely. I often waited over a month for grades" (Fourth year survey participant 41). "Sometimes I think there were unrealistic expectations of assignments with little clarity of instruction. We often didn't receive marks and feedback until the very end of the semester" (Fourth year survey participant 27).

The study participants provided several recommendations for increasing the opportunities for education students to communicate and work with faculty members, outside of the classroom, on activities other than coursework. Students suggested that faculty and field placement mentors use web-based synchronous conferencing tools (e.g., Skype) to establish "virtual" office hours. Many of the students reside a great distance from campus and their field placements and they indicated that the use of these conferencing tools would allow them to have 'real-time' conversations from their homes.

Active and Collaborative Learning

Students learn more when they are intensely involved in their education and are asked to think about and apply what they are learning in different settings (Chickering & Ehrmann, 1996). Collaborating with others in solving problems or mastering difficult material prepares students to deal with the messy, unscripted problems they will encounter daily, both during and after university. In the April 2015 survey a number of participants identified how the institutional emphasis on small class sizes helped foster and promote an active and collaborative learning environment, "I enjoyed the small class sizes. I was able to collaboratively work with my peers and professors, which I believe enriched my learning experiences" (Fourth year survey participant 26). In addition, "I liked having small classes and the opportunity to do different types of projects instead of being limited to papers and exams" (Fourth year survey participant 14).

Both the first and fourth year survey results demonstrate a very high level of active and collaborative learning behaviours including an increase in frequency of class presentations, asking questions in class, as well as working with other students on projects during and outside of class time (Table 3).

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Table 3: Active and collaborative learning

Question	Student Response March 2012 Often/Very Often	Student Response April 2015 Often/Very Often
Make a class presentation	72%	91%
Work with other students on projects DURING class	70%	75%
Ask questions in class or contribute to class discussions	64%	84%
Work with classmates OUTSIDE of class to prepare class assignments	57%	70%
Tutor or teach other students (paid or voluntary)	22%	27%
Discuss ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)	60%	38%
Participate in a community-based project as part of a regular course	53%	20%

Conversely, Table 3 indicates that less than one-quarter of the students were involved in tutoring or peer mentoring activities, which are critical for the development of future teachers (Collings, Swanson, & Watkins, 2015). A formal course assignment was recently designed, which provides all second year Education students the opportunity to learn how to mentor first year students. This assignment was embedded in a second year educational technology course and focused on providing opportunities for second year students to learn how to design, facilitate, and assess peer mentoring support using digital technologies.

This peer mentoring assignment was implemented in the fall 2014 semester and it commenced with the second year teacher candidates providing support to the first year students through the initial creation of their program portfolios in *Google Sites* and journals in *Google Docs*. The plan is to create intentional peer mentoring opportunities through the use of social media applications for students in all four years of the program in order to create a peer teaching and learning circle.

Level of Academic Challenge

Challenging intellectual and creative work is central to student learning and collegiate quality. Universities promote high levels of student achievement by setting high expectations for student performance (Graham et al., 2001). The graduating students commented that they found the curriculum program of studies and their general education and elective courses to be of particular academic value: "I loved the practical skills, strategies, and tools I experienced in the curriculum studies courses because I could easily apply them to my practicum placements and keep them in a bank of resources to use in the future" (Fourth year survey participant 45) and "Integrating our minors and general education classes allowed me to explore different areas of interest more deeply" (Fourth year survey participant 8). A comparison of the first and fourth year survey results indicates that students were increasingly working harder than they thought they could to meet teachers' standards and expectations and that the institution emphasized spending significant amounts of time studying and on academic work (Table 4).

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Table 4: Level of academic challenge

Question	Student Response March 2012 Quite a bit/ Very much	Student Response April 2015 Quite a bit/ Very much
Worked harder than you thought you could to meet a teacher's standards or expectation	70%	82%
Institutional emphasis: Spending significant amounts of time studying and on academic work	85%	79%
Prepared two or more drafts of a paper or assignment before turning it in	43%	40%
Hours per 7-day week spent preparing for class (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)	20% (More than 20 hours)	16% (More than 20 hours)
Working for pay off-campus	75% (More than 10 hours)	72% (More than 10 hours)

The higher education literature related to student engagement advises that students should be investing at least two hours of preparation time for every hour of in-class time (McCormick, 2011). Table 4 suggests that the Education students perceive they are actually spending less time on course preparation as they progress through the program. This can partially be attributed to the fact that the majority of graduating students (72% as illustrated in Table 4) also had part-time off-campus jobs while completing their studies.

Several recommendations were provided to overcome this deficiency in class preparation time. One recommendation was to make the homework assignments more practical in nature, requiring the students to be more engaged with inquiry-based learning projects in partnership with local schools, rather than on just reading and responding to textbook questions. The other suggestion was to increase the program focus on "teaching students on how to create long range unit plans" (Fourth year survey participant 29), "giving more attention to formative assessment strategies and resources" (Fourth year survey participant 11), "including more information about careers and the teaching systems throughout the 4 years of the program" (Fourth year survey participant 23), and "an increased focus on inclusive classrooms, we need to be comfortable with special needs" (Fourth year survey participant 51).

Enriching Educational Experiences

Educational research has demonstrated that complementary learning opportunities inside and outside of the classroom augment the academic program (Kuh, 2008). Experiencing diversity teaches students valuable things about themselves and other cultures. Internships, community service, and senior capstone courses provide students with opportunities to synthesize, integrate, and apply their knowledge. Such experiences make learning more meaningful and, ultimately, more useful because what students know becomes a part of who they are (e.g., developing their professional identity as teachers).

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In terms of enriching education experiences, the graduating students emphasized the first year volunteer placements, school tours, in-school seminars, and practicum placements were their highlights. "I enjoyed that we were able to get into the classroom right from year one, I think that this gave everyone a good idea of whether this was the right career path for them or not" and "I also enjoyed touring different schools in my first year" (Fourth year survey participant 36). "I really enjoyed the in-school seminars during my practicums as they provided us with a time each week for us to meet with our peers and discuss ideas and get support from each other" (Fourth year survey participant 29). They also indicated how important the *Google Doc* journal and *Google Site* portfolio were for "integrating my Mount Royal class and volunteer placement experiences and establishing a philosophy of education that I truly believe in" (Student Focus Group Participant 9).

Table 5 demonstrates a substantial level of participation in many high impact practices such a teaching practicums, the capstone course, and community service or volunteer work (Kuh, 2008).

Table 5: High impact practices

Which of the following do you plan to do and have done before you graduate from Mount Royal University?	Student Response March 2012 Plan to do	Student Response April 2015 Done
Volunteer school placement, teaching practicum	58%	100%
Culminating senior experience (capstone course, senior project or thesis, comprehensive exam, etc.)	23%	100%
Community service or volunteer work	38%	82%
Participate in a learning community or some other formal program where groups of students take two or more classes together	41%	67%
Coursework in a foreign or additional language	25%	26%
Work on a research project with a faculty member outside of course or program requirements	21%	19%
Independent study or self-designed major	12%	18%
Study abroad	35%	4%

Two areas of concern that are highlighted in Table 5 are related to student research and study abroad opportunities. The plan is to work with the Office of Research to develop an institutional undergraduate student research initiative, which has proved to be a challenge given the increasing emphasis on faculty research funding at the expense of student research support. In terms of increasing study abroad opportunities for the Education students', discussions have begun with our International Education Office to identify spring semester general education courses and alternative field placement experiences that are offered in other countries through international partnerships. In addition, the potential of developing an alternative spring break program is being investigated where students would be involved with community service projects in developing countries during the February reading week (e.g., University of Western Ontario, 2016).

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Supportive Campus Environment

Students perform better and are more satisfied at universities that are committed to their success and cultivate positive working and social relations among different groups on campus (Chickering & Gamson, 1987). This NSSE benchmark asks students to rate the quality of their relationships with their peers, faculty members, and administrative personnel and offices. Table 6 illustrates that students perceive reasonably high quality relationships with their peers, but that relationships with faculty members and administrative personnel and offices have declined over the four years of the B.Ed. program.

Table 6: Quality of campus relationships

Quality: Your relationships with:	Student Response March 2012 (6 & 7 out of a 7 point scale)	Student Response April 2015 (6 & 7 out of a 7 point scale)
Other students	61% Friendly, supportive, sense of belonging	60% Friendly, supportive, sense of belonging
Faculty members	50% Available, helpful, sympathetic	35% Available, helpful, sympathetic
Administrative personnel and offices	25% Helpful, considerate, flexible	21% Helpful, considerate, flexible

In terms of peer relationships, the graduating students indicated again that "because the program is so small I was able to make a number of positive and professional relationships throughout the 4 years which will contribute to my career" (Fourth year survey participant 16) and "I really enjoyed the group of students we worked with over the four years. I felt like we were a community that focused on the relationships that we built. I see this transfer at my practicum school I'm at every day. How important strong relationships are" (Fourth year survey participant 21).

With regards to faculty relationships, the fourth year students again had a number of positive comments such as "the relationships I've built with the professors and faculty have been so meaningful and had a really positive impact on my experience" (Fourth year survey participant 44). However, the graduating students expressed several concerns regarding program organization "I did not really enjoy being the "newbies" in the program as things at times were rather unorganized, I also didn't feel at times that the classes and faculty members were consistent with offering the same opportunities for us and also instructing the same content" (Fourth year survey participant 25). Comments like these had also been made by the students in their first year "as this is a new program I understand that it is all not mapped out yet and at times my questions were not as clearly answered as I would have liked" (First year focus group participant 7).

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In order to overcome these challenges, the graduating students recommended asking "for student input when designing and creating changes in the program!!!" (Fourth year survey participant 16). They also emphasized the importance of developing a student "road map" for the program similar to what Queen's University (2016) has done for their concurrent B.Ed. degree.

Table 6 also indicates that the graduating students perceive a declining quality in their relationships with administrative personnel and offices at the university. This could partially be attributed to the fact that over the past four years, the institution has undergone a series of budget cuts, which has led to a reduction in support staff and services. One student commented that she "was very fortunate to have an amazing academic strategist who helped me survive the education program in one piece" (Fourth year survey participant 3). Recently, the B.Ed. program has hired a dedicated part-time academic advisor and a new full-time field experience coordinator, which will improve the quality of administrative support for students in the B.Ed. program.

In addition, the university acknowledges "that support staffing levels in academic departments and faculties have not kept pace with recent growth in size and complexity" and thus we are "investigating ways to make procedures and practices more efficient" (Mount Royal University, 2012; p.15). Recently, the institution has implemented a web-based application entitled *mruGradU8* (http://www.mtroyal.ca/mruGradU8/), which allows students to track their program progress by reviewing their academic history and identifying course requirements that they still need to complete to graduate.

Conclusion

Over the past decade, there has been an increased focus on student engagement in higher education because of rising tuition costs and concerns about student success and retention rates (Kuh et al., 2005). This student-faculty research participant study has demonstrated how digital technologies can be used to increase student engagement and success in a blended Bachelor of Education program through the use of the NSSE evaluation framework. For example, student and faculty interactions, outside of the classroom, can be enhanced through the use of web-based conferencing tools to support "virtual" office hours. Course assignments that incorporate peer mentoring activities through the use of social media applications can provide richer opportunities for active and collaborative learning. More intentional theory into practice connections between academic coursework and field placements can be created through the use of *Google* applications. Enriching educational experiences can be expanded through the use of social media applications to promote and communicate student led academic and social events. In addition, a supportive campus environment can be improved by the development of a digital 'road map' and co-curricular record for the program.

This research study has also illustrated the importance of student and faculty collaboration in the evaluation process for an undergraduate degree program. As the African proverb suggests

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"it takes a village to raise a child" to which Saint-Jacques (2013) adds "that a shift toward a 'we-learning' conceptualization of education" will benefit us all (p.34).

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TEACHING SCIENCE THROUGH TECHNOLOGY AND CREATIVITY IN INNOVATIVE LEARNING ENVIRONMENTS

Antonella Poce, Francesco Agrusti, Maria Rosaria Re, Università Roma Tre, Italy

Summary

The purpose of this work is to demonstrate that the critical use of technology to increase the efficacy of teaching, in particular in the field of science, is the key to single out solutions able to increase development and growth, from which, in turn, the whole society can benefit. The challenge faced by the LPS group in planning the activities for more effective and engaging science teaching, is based on the possibility to share and fill the learning needs of various categories of people, students and teachers, inhabitants of a given territory, researchers, involved in the initiative and animated by the need to find solutions to the educational problems they deal with. On a devoted learning platform, described in the contribution at length, the student's lab has been planned as a set of on-line group activities, with the general aim to provide useful elements to understand the typical characteristics of the language of science and create the structure of a creative text with a scientific topic through cooperative writing. Findings from the data collected after a specific evaluation plan are given and discussed revealing as successful the combination of creativity and science subjects.

State of the art

The *science/technology – public* relation is being reconfigured in a dialogic form. The attempt to reduce the informative asymmetries between scientists and users is related to the importance of scientific training, from a cultural and practical point of view (understanding of the function and use of technology devices in daily life), as well as from a political one (participation on the basis of conscious and well informed choices) (Thomas & Durant, 1987). Scientific and technologic culture, relevant element of the shared encyclopaedia and the individual knowledge, also becomes a tool for social and political participation. Such issue gains more importance if one takes into consideration the effects that techno-scientific knowledge reaching the mass public produce on behaviours, in terms of orientation, value-based choices, fruition capacity of the technology-related opportunities and the formation of a critical perspective. Field studies demonstrate the users' deep inability to knowingly understand and manage the technological resources, as well as a profound interference of the mediated information sources to the detriment of an objective and realistic evaluation of the access to the techno-scientific knowledge (ISTAT, 2007; Pinnelli, 2009). In light of what above mentioned, that of the dissemination of popular science is, today, a duty of public institutions as well as a right of the citizens who can, thanks to such information, actively participate in the democratic and associative life of their own community. New technologies, in general, and the web 2.0 tools, in particular, have increased the possibilities for researchers to reach, with zero costs and in real-time, their interlocutors. At the same time, however, the risks related to the authoritativeness of the sources increased as well. If used according to the criteria of a structured reference model, technology is capable to provide room for further examination, with tools designed to represent stable architectures able to fill the cultural voids, easily detectable in today's student population, thus making the development of a responsible and impartial critical knowledge among the younger generations possible. That of technology is a culture without depth, because it is characterised by the rapidity with which the various technical solutions come one after the other on the market. In the field of didactics, there are permanents features and transitory functions. It is therefore necessary to find a coherent and effective connection system between the two dimensions. As claimed by Vertecchi (2012), the substantial difference between technological developments and tradition-related practices relies on the interpretation of time and space: a further step forward is necessary to conceive a model to which the combination technology/education can adapt. If the classic models of education are essentially about the first part of life (infancy and adolescence), it appears, today, necessary to extend this time span including adult life, for which there is no specific model of reference.

The purpose of this work is to demonstrate that the critical use of technology to increase the efficacy of didactics, in particular in the field of science, is the key to single out solutions able to increase development, from which, in turn, the whole society can benefit.

Research design and methodology

According to such premises, within the project for the creation of an *Observatory for Biodiversity* in Sicily, LPS – Roma TRE created and organised a programme of science lab activities, diversely addressed to those teachers and students who took part in the project. Such plan involved five schools in the area of Palermo (two lower level and three higher level secondary schools) with a total of 120 students and 14 teachers. The activities were carried out in a mixed modality: part in presence and part through the dedicated electronic platform, *Orbis Dictus*, developed by LPS within a former national project, FIRB (Fund for Basic Research Investments, funded by the Ministry of Education, University and Research) *am-Learning* (Adaptation of the educational message) (Vertecchi, 2011). The idea at the core of the project for science teaching comes from the need to strike the balance between different interests: not only those of the students and teachers, but also those everyone acting in the field of reference. To this end, the activities were structured in such a way that the teachers could be able to guide their students through a shared learning path. Following some introductory meetings with the LPS researchers, during which the activities and the prerogatives of the online learning environment were presented, the users could carry on autonomously on the educational path. This was divided in two modules: one for the teachers and one for the students.

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The *Teaching Science* lab's objective was to provide the teachers with the theoretic and practical tools to guide their students towards a critical and aware use of the dissemination and public communication of science. The module's activities were described to the teachers through the *Orbis Dictus* (http://www.orbisdictus.it) platform. Their aim was the creation of an educational platform connected to issues in the field of biology, assigned by the platform's tutors to the end of drafting a scientific text. The idea to implement the project in a "distance learning mode" comes from the awareness that on line learning, in this case the self-teaching of the teachers, is a fundamental tool for the production and creation of knowledge: if inserted in a well-defined and structured educational path, technology can represent a valid solution for improvement. Starting from the visualization of videos whose object of analysis was Descartes' *Discourse on the method* (1637) and through guided discussions coordinated by the on line tutors, the teachers were given the chance to achieve various goals: increase their own critical thinking abilities, update on the specific characteristics of the scientific language and use such knowledge directly in the educational context, as well as increment their own competences as for the use of technologies for education. The creation of the educational unit, to be constructed following a planning approach and with the final goal of the production of a written text on a scientific topic by the students, was, for the teachers, an important chance for growth. On the other hand, autonomously, in their virtual area of reference, the students were called to reflect on the levels of complexity of some proposed texts for the transmission of contents, on the choice of language used and to be used, as well as on the modes of representation of a given content. As a first task, they were engaged in the analysis of the writing techniques of the texts on the singled out subjects, in the planning and definition of a working methodology and in the actual writing of a new learning/teaching text, in the form of a fictional story, solving the educational issues they were faced with during their work. Meta-objectives of the module dedicated to the students were singled out, such as the possibility for them not only to increase their own linguistic abilities, sometimes inadequate mainly as for the grammatical and syntactic structures, but also to increase their abilities regarding the argumentation in written form, the development of critical thinking and creativity. To this end, the students' module provided basic tools for the production and analysis of fictional (short stories, novels and screenplays) and non-fictional (newspaper articles and short essays) texts. Aspects related to creative writing were dealt with, and the basic elements and writing techniques of various genres were described, such as those of short stories and novels, cinema and television screenplays, theatre, radio, comics. The educational activities were structured so that the students could get to know and understand the world of narrative and the fundamental theories of narration, developing specific abilities. The writing module was outlined as a moment of organised and specific confrontation in a relation of stimulus, perception and internal elaboration of mental images. During the on-line lessons, students were provided with the necessary instruments to create the characters, structure the plot and avoid the most frequent narrative traps. Through practical exercises, every pupil finally gathered information to work on an outline and organically develop the narration. To sum up, the students, guided by their teachers, who were contextually engaged in the reflection on and planning of a dedicated educational unit, wrote short stories on biodiversity-related topics

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and took part in an internal competition, judged by a committee created for the purpose, consisting of an educationalist, a marine biologist and a professional writer.

The challenge faced by the LPS group in planning the activities for more effective and engaging science teaching, is based on the possibility to share and fill the learning needs of various categories of people, students and teachers, inhabitants of a given territory, researchers, involved in the initiative and animated by the need to find solutions to the educational problems they deal with. As already mentioned, the outlined models and procedures attempt to answer to the necessity to involve all kinds of actors, by exploiting the potential of an aware and critical use of technology.

The following paragraph describes the peculiarities of the platform where the above activities took place.

The Orbis Dictus Platform

Over the last decades, the constant evolution of information and communication technologies (ICT) applied to teaching allowed a rapid development and an ample diversification of the technologic offer, mainly in the field of distance education. Within this new branch of research, named *Technology Enhanced Learning*, there are various tools and learning methods through new technologies, among which the creation of virtual platforms for e-learning. Numerous e-learning platforms were designed over time, constantly competing against each other, with various levels of differentiation as for the services provided. However, all those platforms employed new technologies to optimise the various aspects of the distance communication between teacher and learner, in order to make it faster, stronger, multimedia, etc. The idea at the core of the *Orbis Dictus* platform is to adapt the message to the receiver, not to force the latter to adapt to the educational content (Agrusti & Harb, 2013). In brief, firstly, it is necessary to draft a student's profile by gathering as many data as possible. Secondly, the didactic material must be adapted to the profile. The student's profile must be then newly evaluated, thus creating a virtuous circle in which the learners learn thanks to didactic materials tailored in their difficulty to their competences, or at a slightly higher level. In order to achieve such objective, a modular approach has been chosen: three software tools have been created in order to carry out each one of the three abovementioned phases in a semi-automatic way. Such software tools are able to communicate among themselves in a fully integrated system.

LexMeter

In order to plan and develop a new, innovative platform aimed at an extreme level of individualisation, the first need has been to define a profile of the verbal abilities of each student. Such profile has been identified as the preliminary condition to the following elaboration of the *individualised* messages, tailored to each student's needs. In order to carry out this activity, *LexMeter* (Agrusti, 2010) was created. Such tool allows an estimate of the number of words known to each students so to create a personalised scheme of lexical competences. In order to measure this, the software tool automatically generates tasks to be

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completed, prepared not only to calculate the number of terms the student knows, but also the *typology* of said terms. Such tasks are not based on classic criteria (a word is removed every fixed number of words, or the articles, the prepositions and the linking words are eliminated). The elimination of the words is based on their frequency of appearance. In this sense, *typology* of the term means the (supposed) difficulty for a student to understand a sentence containing that given word.

Adapter

A second programme ensures the passage from the estimate of verbal competence to the adapting of the message. In other words, the idea is to move from a message aimed at a virtual receiver (the one that the creator of the text had in mind) to one more tailored on the needs of the real recipient, that is one student that distinguishes himself for a given repertoire of lexical competence. The transformation is carried out automatically by *Adapter*, that individualises the teaching message by automatically introducing textual supports (short explanations) to increase its comprehension. In other words, this software tool is used to automate the modulation of low-frequency words in the teaching message by adapting the message to the real target users (the students). The hypothesis is that the low-frequency words within the archive of texts are words difficult to understand due to their low appearance in the manuals. By integrating such words with explanatory notes it is more probable that the students can better understand the texts, thus learning more easily.

ProgressMeter

Last but not least, *ProgressMeter* has been developed. It is a programme aimed at reconstructing the learning path of each student, by noting the variations that take place in each lexical competence profile (Agrusti & Harb, 2011). Such software tool creates self-assessment tasks in order to differentiate the effort required from each student, defining, in each case, a variable interval between the virtual receiver's lexicon and the real receiver's lexicon. In other words, the programme extrapolates sentences from a text chosen by the teacher and already present in the didactic path, it highlights only the sentences containing the words from the text's glossary (the same one used by *Adapter* to adapt the texts' content) and creates a fill-in-the-gaps task by selecting five sentences in which a gap has been created by eliminating one of the words from the glossary.

Such software tools have been integrated in the applicative platform *Orbis Dictus*, a collection of programmes providing e-learning courses in order to answer the strong needs of individualisation foreseen in the educational model.

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The students' activities under investigation

The student's lab has been planned as a set of on-line group activities, with the general aim to provide useful elements to understand the typical characteristics of the language of science and create the structure of a creative text with a scientific topic through cooperative writing. The objectives of the module's didactic path are outlined as follows:

- analysis of the lexicon, syntactic and grammatical structures of the examined texts;
- choice of the writing style;
- production of an original text;
- development of argumentative abilities in written production;
- development of critical thinking and creativity;
- effective use of technology.

In fact, the lab addressed the aspects related to creative writing, by providing the basic elements and techniques of various genres, with the aim of making clear to the students what the necessary knowledge for the proposed writing activities was and allowing them to get to know and understand, with specific competences, the world of narrative and the basic theories of narratology.

The didactic path within the students' lab was divided in three units, each one with its specific objectives:

1. first unit: analyse a narrative scientific text according to the elements of narratology, scientific language and creativity;
2. second unit: plan and realise the creative scientific writing through the actual writing of the end to a short story provided;
3. third unit: create, plan and realise a creative scientific text related to the themes connected to the *Observatory of* marine *Biodiversity.*

Every teaching unit was completed through group work; the activities, the works of the single groups and the time schedule were monitored by on-line tutors. Following are the themes assigned to the groups of students for the realisation of the final story: Turtle, Dolphin, Lobster, Tuna Fish, Seahorse, Octopus, Nudibranch, Pinna Nobilis, Sea Star, Shark.

Seven groups, made of 8/9 students each, accomplished all the activities foreseen and handed out a complete creative product. The short stories written by the students were evaluated by an ad hoc board to assess the achievement of the objectives foreseen within the learning path. The last activity must be regarded to as the summative task of the didactic path in the students' lab. Consequently, the evaluation of the task was deemed necessary to analyse the entire course of the didactic intervention. According to the objectives and the meta-objectives singled out within the activities and the module in general, an evaluation grid was created for the assessment of the short stories, which is presented in the dedicated content.

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Analysis and findings

In order to set the evaluation of the creative short stories written by the participating students, the LPS research group moved from ideas related to the evaluation of critical thinking. The purpose of the creative feature was to support the focusing and emotional internalisation of the scientific topics that were objects of study. Paul and Elder (2012) claim that students that think critically use writing as a useful tool for communicating ideas important for learning. To elaborate a concept by writing is useful to clarify it and to acquire a higher level of precision, accuracy, relevance, depth, width, logic ability and meaning. Through writing, pupils find it easier to carry out a process of analysis and evaluation of the ideas they had while studying. Paul and Elder also state that such process can help both the learning and writing abilities, and those activities influence one another. The assessment tool created by the LPS researchers aimed, in this phase, at finding the following abilities in the products of the students' work:

- reflection;
- writing;
- analysis and synthesis;
- exemplification;
- connection of ideas;
- development of a thesis;
- understanding of the proposed scientific elements.

The assessment tool, therefore, has been structured in five sections that contain elements whose focus shifts according to the aspect object of interest. The pre-experimental character of the employment of such tool has not allowed carrying out statistical measurements on the gathered data. It allowed, however, the assessing committee (who work in different fields but were all equally involved in the kind of activity required from the students) to express a more objective judgement, coherent with the task fulfilled. The following table shows the scores assigned to the students' short stories. Each work is indicated with a letter of the alphabet in the first column on the left, while the lines contain the points given by the three members of the commission.

Table 1: Assessment for each macro-indicator by each member of the committee

	Educationalist					Scientist					Writer					TOTAL
	Pertinence	Content	Form	Originality	Scientific language	Pertinence	Content	Form	Originality	Scientific language	Pertinence	Content	Form	Originality	Scientific language	
A	9	10	9	9	8	7	10	6	8	8	10	10	10	9	8	131
B	8	7	8	8	8	8	10	8	8	7	10	10	9	8	8	125
C	6	6	4	6	7	7	10	6	8	8	8	10	5	6	10	107
D	7	8	6	7	8	7	9	6	7	6	7	9	10	6	2	105
E	6	6	6	6	7	6	8	7	6	4	7	7	6	5	5	92
F	4	4	7	5	4	7	9	7	7	6	2	2	6	1	2	70
G	6	5	4	6	7	4	7	4	4	4	1	2	2	2	0	58

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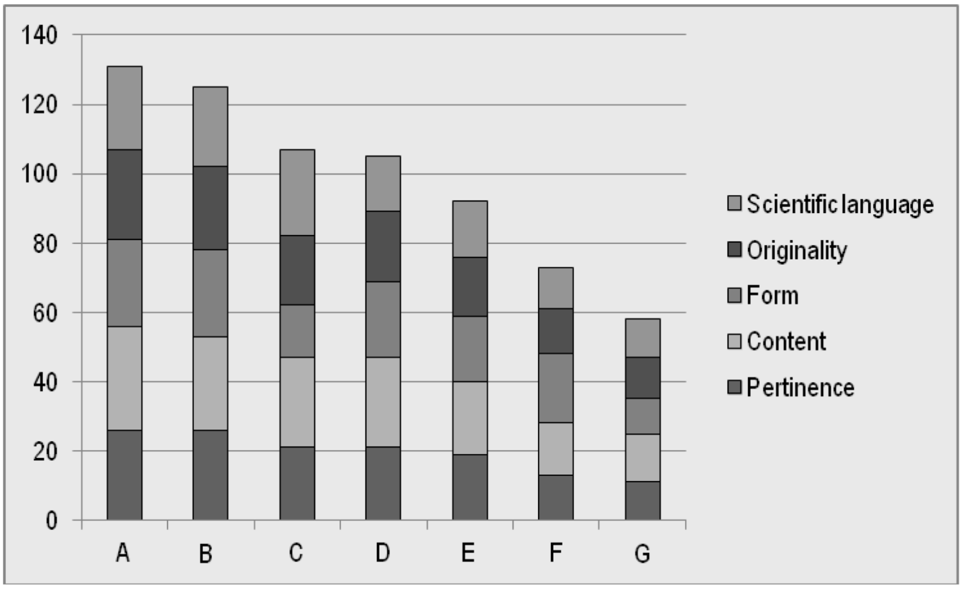

Figure 1. Bar graph of students' work evaluations

The *content* category has shown the best results: excellent and brilliant marks have been related, as previously underlined, to the ability to make use of the key elements of creative writing. The *form* and *exposition* indicator revealed, in some productions, the use of a correct and fluid speech, which also was original and strongly connotative, thanks to the use of a literary and rhetorically inspired language. In some productions the form was generally correct. Statistically minimal is the presence of punctuation and syntax errors. The *originality* category highlights good results, with peaks of excellence, in all the stories submitted. The knowledge on creative writing and the scientific topic were used in an original way and were inserted in a context that was carefully created and never banal.

Conclusive remarks and possible developments

It is useful to underline that the use of the *Orbis Dictus* platform allowed the students to work in a flexible and dynamic environment (Vertecchi et al., 2010), that supported the didactic path by providing all the necessary tools. The use of an e-learning group process, constantly supervised by the e-tutor, required strong coordination among the students, which resulted in a stronger boost by the participants in the presented activities, mainly thanks to the motivational expectations of the fellow students of the group. The cooperative learning and working mode has been, indeed, accepted since the very beginning by the students. This led to remarkable results in terms of participation and organisation of the work, as well as, as shown by the reported results, in terms of quality of the products. With reference to the tools provided, the choice to present and use in the activity short stories from the collection *Narrating Science* proved to be functional to the objectives of the LPS' group project. The students were able to confront themselves with texts written by fellow students which were characterised by the core elements of their learning path: the creative short story and the technical-scientific language. The use of such material proved to be important both in the initial phase, that in which students became acquainted with the proposed contents, and in the final one, that of the actual, written production of an original short story.

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About the Authors

A. Poce coordinated the research presented in this paper. Research group is composed by the authors of the contribution that was edited in the following order: A. Poce (State of the Art, Research design and methodology, Conclusive remarks), F. Agrusti (The Orbis Dictus platform), M.R. Re (Analyses and findings).

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CONTRIBUTIONS TO TEACHING PRACTICE OF AN ONLINE COMMUNITY OF PRACTICE OF TEACHERS AND RESEARCHERS

Margarida Marques, Maria João Loureiro, Luís Marques, University of Aveiro, Portugal

Summary

Communities of practice (CoP) have the potential to promote teachers' professional development (PD) and change practices. However, empirical evidence is still scarce. This study aims to contribute to address this shortcoming by analysing an online CoP. A qualitative, descriptive, and exploratory single case study was performed. It focused on both the teaching practice and the CoP's dynamics of interaction. Data collection included online platform information (statistic data and posts automatically recorded) and documents. Data analysis was based on content analysis and was organized accordingly the Interconnected Model of Teacher Professional Growth that Clarke and Hollingsworth proposed in 2002. The analysis was made on: (a) the external domain and domain of practice of curricular development (CD), in other words, their dynamics of interaction; (b) the domain of the consequences in the teaching practice, regarding the developed science teaching strategies; (c) evidence of their innovative nature; and (d) the principles of curricular development (CD) enacted. The results show that (a) the members' participation varied during the interaction period and their dynamic fits an adaptation of the stages of development of a CoP proposed by Wenger et al. in 2002, with two cycles of action-research; (b) the CoP developed diverse teaching strategies, usually not explored by teachers, and coherent with commendations in the literature; (c) the teaching practice was innovative, in a challenging way; and (d) the CoP enacted several principles of CD recommended in literature, namely flexibility and differentiation. The empirical results also allowed to validate the dimensions of the Clarke and Hollingsworth's model, as well as to adapt it to the specificity of the analysed case.

Introduction

The open and distance learning movement is increasingly growing and can take different formats and shapes. One relatively new form of learning, particularly about a certain practice, is the one happening as a consequence of the participation in a social grouping, working on issues and solving problems, genuine and emergent from the practice of common interest as happens in the so called *communities of practice* or CoP (Lave & Wenger, 1991; Wenger, 1998). When these communities use telecommunications, such as online discussion boards or even mobile phones, to allow interaction of members with each other and with artefacts or resources, they are usually called virtual or online CoP.

Over the years, the CoP concept has been extensively used to support professional development (PD) and manage knowledge within organizations, in several professional contexts, such as midwives, Liberian tailors, navy quartermasters and meat cutters (Lave & Wenger, 1991) or even teachers (e.g., Cuddapah & Clayton, 2011; Howell, 2007). However, and particularly in the Education area, studies frequently focus the description of how CoP can be created or sustained, as well as their advantages for PD, without presenting evidence of change in teaching practices. Hence, *this work aims* to contribute to fill in this gap, by reporting the contributions of an online CoP, of teachers and researchers, to the changing of teaching practices in Science Education (SE) (Figure 1).

In line with the above presented, a *case study* of a specific CoP in the context of SE, collaborating at distance through online technologies to develop a curricular module, was performed (Marques, 2014). The analysis was organized taking into account the Clarke and Hollingsworth (2002) *interconnected model of professional growth* (IMPG), which was based on empirical data. The authors claim that teacher professional growth occurs through reflection and enactment in four domains: external (the stimulus triggering the professional growth), personal (i.e., the teacher's knowledge, beliefs and attitudes), practice (the teacher's experimentation in his/hers professional actions), and consequence (the acknowledged consequences of the experimented actions). By presenting these domains interconnected, the model proposes that a change in one can induce change(s) in another domain(s). Thus, this model recognizes multiple possible pathways in professional growth, and, therefore, the occurrence of learning in different contexts and formats.

The developed work is based on two *assumptions*, arising from the literature:

- online CoP have the potential to contribute to teacher professional growth (Dede, 2006; Lai et al., 2006; Loureiro et al., 2009); and
- a change in a teacher external domain, e.g., through the participation in an online CoP, can induce changes in the practice and consequence domains (Clarke & Hollingsworth, 2002).

This study, as other studies before (Justi & Driel, 2006; Witterholt, Goedhart, Suhre, & Streun, 2012), uses the IMPG to support the understanding of teacher professional growth, regarding teaching practices developed in an online CoP. The *research questions* were defined to focus the analysis in some of the teacher domains. They are:

1. What are the dynamics of interaction of the selected online CoP? – external and practice domains;
2. To what extend are the teaching strategies, of the selected online CoP, coherent with literature indicators, from the SE research, regarding strategies effective in pupils' learning? – consequence domain;
3. What is the potential of the selected online CoP for the development and adoption of innovative teaching practices and, thus, for PD? – consequence domain;

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4. What principles of curricular development (CD), acknowledged in the literature, were enacted in the development of the curricular module of the selected online CoP? – consequence domain.

Each one of these questions was analysed in previous work (question 1 in Marques, Loureiro, & Marques, 2016; question 2 in Marques, Loureiro, & Marques, 2015a; question 3 in Marques, Loureiro, & Marques, 2011; and question 4 in Marques, Loureiro, & Marques, 2015b), being this a synthesis effort to present some of the main lessons learned. Therefore, the developed work allowed presenting a set of recommendations regarding measures to promote the contributions of online CoP to innovation of teachers' practices in SE. Figure 1 synthesizes the relation between the research questions, the IMPG, the published papers and the emergent recommendations.

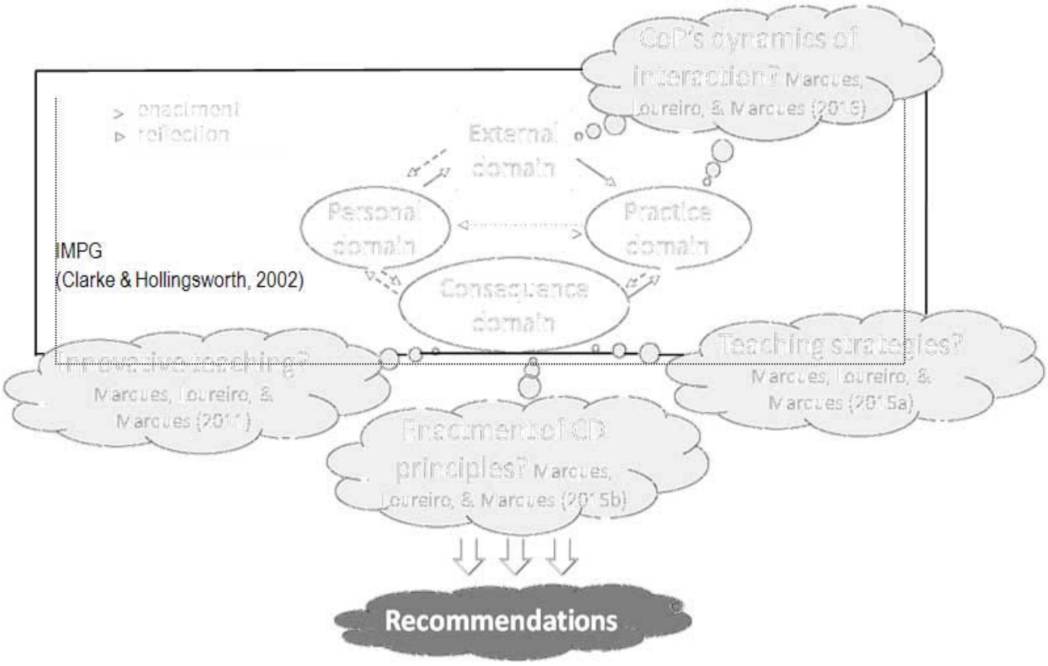

Figure 1. Relation between the research questions,
the Interconnected model of professional growth or IMPG (Clarke & Hollingsworth, 2002),
the published papers and the emergent recommendations

Methodology and contextualisation

The *research design* of this study is qualitative, descriptive and exploratory (Berg, 2001; Yin, 2009), as the documentation of the contribution of teacher participation in online CoP to teaching practice changing is still scarce (Avalos, 2011; Lai et al., 2006). Both the contemporaneity of the phenomenon, in a real life context, and the type of research questions proposed justify the case study methodology option (Yin, 2009). Additionally, the aim was to deeply understand a single case, without concerns of comparing it to other cases nor with result generalizations (Yin, 2009).

The CoP selected for study was formed and sustained under a Portuguese research project, the "Investigação e práticas lectivas em Educação em Ciência: Dinâmicas de interacção" (IPEC).

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In previous work (Marques, 2008), an IPEC group, named G2, was selected for analysis due to the fact it presented several features of a CoP in its interactions.

Under *research question 1*, two years of online interactions regarding the planning, implementation and assessment of a curricular module by G2, as well as all the documents produced in this context, were submitted to content analysis. The analysis scheme was produced as a result of a literature review, regarding CoP life cycle, allowing comparing several models of CoP phases of development (Gongla & Rizzuto, 2001; Grossman et al., 2000; Howell, 2007; McDermott, 2000; Wenger, 1998; Wenger, McDermott, & Snyder, 2002). This allowed selecting a model, Wenger et al. (2002), and adapting it to integrate other models' features, coherent with G2's empirical data. The resultant analysis instrument is one of the contributions of this work. Additionally, descriptive statistical analysis was used to determine G2 members' levels of access and publication in online fora. More details regarding this work methodology options are presented in Marques et al. (2016).

To attend *research question 2*, a literature review of international studies, particularly meta-analyses of strategies with impact on pupils' science learning (Furtak et al., 2012; Marzano, Gaddy, & Dean, 2000; Schroeder et al., 2007; Wise, 1996; Wise & Okey, 1983) was performed. The emergent instrument of analysis was applied to the curricular module developed by G2, its members' reports regarding the IPEC project and the group's published papers and communications. More details regarding this work are presented in Marques et al. (2015a).

Regarding *research question 3*, the study of the innovative features of G2's practices was performed with literature descriptors the work of Jaskyte et al. (2009) and of Cachapuz, Praia, and Jorge (2002). Here, the empirical data was submitted to content analysis using these authors' indicators of innovative teaching practices in SE. Once again, the resulting analysis scheme is one contribution of this work. More details about this analysis' methodology are presented in Marques et al. (2011).

At last, to address *research question 4*, G2's enactment of CD principles, identified through a review of international literature (e.g., Anderson & Rogan, 2011; Gaspar & Roldão, 2007; Kelly, 2009; Pacheco, 2005), was also analysed. In this, a qualitative analysis instrument was proposed and applied to the CoP's empirical data. More details regarding this work are presented in Marques et al. (2015b).

Results presentation and discussion

As mentioned before, the research guided by *question 1* addresses the external and practice domains of the IMPG. Regarding G2 teachers' *external domain*, the data collected allowed acknowledging the following CoP's phases of development in G2's online interactions:

- Potential phase – involved the exploitation of the online platform used in the interaction under the project IPEC, the discovery of members' common interests regarding the teaching practice, and the negotiation of a work plan for G2;

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- Coalescing phase – G2's members shared teaching experiences, discussed educational concepts, made recommendations for academic readings about SE, and, hence, developed of a common practice;
- Maturing phase – comprised the assessment of the curricular module and the identification of the cutting edge issues, particularly the definition of the module's educational aims and assessment strategies;
- Hosting phase – G2 developed a sense of property and pride in the developed work, which was translated into its dissemination in the teachers' schools and in education congresses (Marques et al., 2016).

In the *practice domain* of the referred model, G2's development of a curricular module based in two cycles of research-action (e.g. Altrichter, Posch, & Somekh, 1993). Considering the theoretical frame of categorization of action-research modes, explored by Mamlok-Naaman and Eilks (2012), G2's research process started as a practice action-research and evolved to an emancipatory mode, due to the development of innovative teaching practices, which were disseminated by the teachers involved in their development. Additionally, the literature recognizes action-research as a promoter of teachers' autonomy and of teaching practice changing as well (Borko, 2004).

Moving towards IMPG's *consequence domain*, under research *question 2*, the analysis showed that G2 developed a curriculum integrated field trip, contextualized in real word situations and combining diversified teaching strategies, such as learning of contextualized phenomena, debate in small groups or intentional questioning (Marques et al., 2015a). All of these were referred in the literature as effective science teaching strategies (e.g., Schroeder et al., 2007; Wise, 1996). Regarding the mobilized resources, the main ones were information and communication technologies, e.g., for presenting information, either by teacher and by pupils, or for reducing the novelty-space (Orion, 2007); several laboratory and outdoors instruments; and G2's fieldwork guide. The traditional blackboard and textbook were not frequently used, contrasting with other studies' results (e.g., Herbert et al., 2003). Considering IPEC's teachers teaching practices characterization, made at the beginning of the project (L. Marques et al., 2008), this analysis revealed an evolution of G2's teachers teaching strategies that was acknowledged by themselves (e.g., Morgado et al., 2008). Additionally, the development of a content analysis instrument for effective teaching strategies in SE allows educators aligning specific teaching strategies with indicators from meta-analytic studies (e.g., Schroeder et al., 2007). This instrument is also useful for science teachers that which to diversify and adapt their set of teaching strategies, sustaining their options in literature recommendations.

Still in the consequence domain, the *research question 3* prompted the analysis of the coherence of G2's teaching practices with innovation indicators for SE, present in the literature (Marques et al., 2011). In this study, empirical data was collected and linked to 13 out of 14 innovation descriptors in science teaching, supporting the claim that G2 developed challenging innovative practices (Adams, 2003). Moreover, other teachers from G2's schools got involved in this CoP practices. This contributes to sustaining the claim that innovation created by teachers can more easily be disseminated and adopted (Towndrow et al., 2010).

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Finally, the literature review performed for *research question 4* allowed identifying six CD principles. Crossing these with the empirical data revealed that G2 enacted all the principles:

- not centralized CD – in this CoP, the decision making was shared both by teachers and researchers, as well as with other teachers from the G2 teachers' schools and even some contributions from their students;
- CD flexible and differentiated – the definition of alternative teaching and learning sequences and the adaptation of the initial curricular module, to better fit each teacher educational context, were important features;
- CD contextualized in Science-Technology-Society-Environment – the curricular module is based on pupils' analysis and decision making regarding a controversial societal problem;
- Integrated CD – there is an explicit articulation of the academic subjects of Geology and Chemistry;
- CD with iterative phases – two cycles of action-research were identified;
- Reflexive CD – this was shown in previous related work (Cruz, 2010).

Considering the above presented, the participation in this online CoP originated a CD coherent with literature emerging principles, which was a relevant *consequence* for the teaching practices of G2 members. This study allowed empirically validating a set of theoretical CD principles, as well as the literature-emergent analysis instrument (Marques et al., 2015b).

Conclusions and implications

In this case study, Clarke and Hollingsworth (2002) IMPG revealed to be useful for the understanding of the implications for the professional growth of teachers participating in an online CoP. Additionally, this study allowed to recognize some features for the adaptation of the model to this context (see Figure 2), which are explained in the following paragraphs.

Regarding the process leading to the development of a curricular module, the results were analysed considering two cycles of action-research. These contributed to the changing of teaching practices, in an emancipator way (Mamlok-Naaman & Eilks, 2011). In Figure 2, the changes in the analysed domains are represented, after triangulation with the members' views, which were disseminated in papers and communications. The adaptation of the IMPG to this online CoP context is a theoretical contribution of this work.

In this case study, the environment of professional growth or teacher PD, named changing environment by Clarke and Hollingsworth, is the online CoP formed under the IPEC project. The interaction dynamics established in this community are coherent with an adaptation of Wenger, McDermott, and Snyder (2002) model. It inclusively revealed a high variation in the levels of participation in the CoP activities, during a two-year collaboration period. Among the stimuli characterizing this teachers' *external domain* are:

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- the identification of problems emergent from the teachers' practices (L. Marques et al., 2008), and hence, with high relevance for the teachers and attending their professional concerns;
- the continued interaction between science teachers and researchers in SE, in an online environment. This type of partnership is recommended in the literature (e.g., Kraayenoord, Honan, & Moni, 2011);
- the sharing of a common purpose - improving teaching practice (L. Marques et al., 2008; Wenger, 1998).

Reflection processes about, e.g., ideas and concepts discovered/revisited through academic readings on SE; teaching experiences; or the explanation of why some curricular decisions were made (as stated in, e.g., Morgado et al., 2008), induced changes (represented by arrow 1, in Figure 2) in the *practice domain*. In this manner, they lead to professional experimentation (represented by arrow 2) regarding planning CD processes (collectively, literature informed, and with distance communication tools); the implementation of new ways of teaching (new, at least for the teachers involved in the online CoP); and even the development of unusual assessment processes (Lucas & Vasconcelos, 2005). All of these occurred in a cycle of action-research (Altrichter et al., 1993) that lead to the development of the first version of the curricular module.

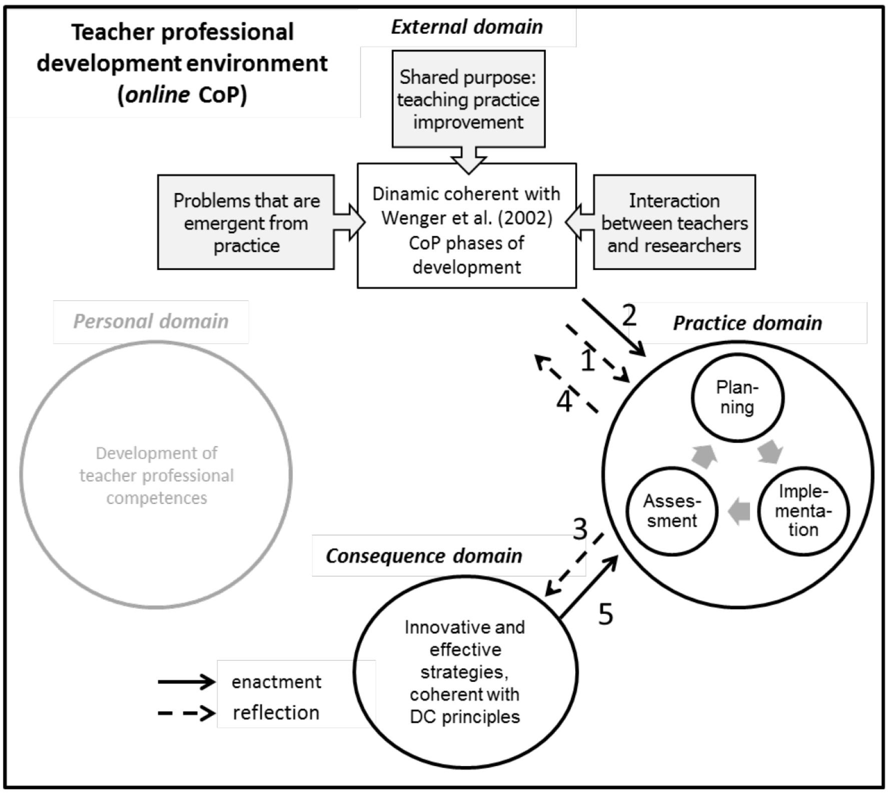

Figure 2. Adaptation of Clarke and Hollingsworth (2002) interconnected model of professional growth to the studied case

The reflective processes, on the curricular module's assessment results, induced changes in the *consequence domain* (represented by arrow 3). G2 members acknowledged the innovative character of the developed practices (Morgado et al., 2008). This study's results support G2's

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self-report, as it allowed identifying empirical evidence pointing to the development of innovative and effective teaching strategies, which are also coherent with CD principles from the literature. Simultaneously, the same reflective processes lead to changes in the *external domain* (represented by arrow 4) as the CoP's dynamics started including interactions with teachers from G2 teachers' schools, i.e., each G2 teacher was a disseminator of the curricular module, an innovation, in their own school community. Thus, the action-research process they undertaken acquired an emancipatory feature (Mamlok-Naaman & Eilks, 2011). Furthermore, the acknowledgment of the consequences valued by G2 members lead to the second action-research cycle, with contributes from their local group of teachers, involving more experimentation in the *practice domain* (represented by arrow 5).

Finally, the *personal domain* appears greyed in Figure 2, due to the fact that this case study focused in the identification of contributions of an online CoP of teachers and researchers to their professional growth at the teaching practice level. Further research should include the analysis of changes in the personal domain, as well as consider other theoretical frameworks, such as activity theory (Engeström, 1999; Vygotsky, 1978).

At last, each one of the papers related to this synthesis effort present a set of lessons learned. Here, we highlight the following recommendations to enhance the contributions of online CoP of teachers and researchers in SE to the teaching practices:

- expect participations peaks in the community activities and act accordingly, e.g., by promoting member's interactions in critical periods;
- value teachers' contributions, increasing their confidence in their ability to participate;
- avoid deadlines close to the end of the terms, when Portuguese teachers seem to be submitted to higher workload – similar limitations have been reported before (Pereira, 2007), but not at this level of detail;
- propose the development of cycles of action-research of the emancipatory type (Mamlok-Naaman & Eilks, 2011).
- support teachers in the theoretical clarification of teaching strategy (Leite, 2010);
- support teachers in the broadening of their teaching strategies repertoire;
- support teachers in the development of innovative challenging teaching practices (Towndrow et al., 2010), instead of innovations imposed by, e.g., the government (Aubusson, 2002).

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THE IRISH ONLINE LEARNING LANDSCAPE: A CRITICAL TOUR THROUGH THE VALLEY OF THE SHADOW OF THE MOOC

Mark Brown, Eamon Costello, Dublin City University, Mairead Nic Giolla-Mhichil, National Institute for Digital Learning, Dublin City University, Republic of Ireland

Summary

This paper adopts a multi-layered metaphorical framework drawing on a combination of critical discourse and policy analysis and a single institutional case study to describe the somewhat messy and fragmented nature of the Irish online learning landscape. At a macro–level it adopts a bird's eye bifocal perspective to identify some of the grand narratives and competing and co-existing discourses in the current drive to build digital capacity in Irish higher education. Through this analysis the framing of online learning is shown to be part of wider social practice that cannot be separated from deeper debates about the funding of public education and the nature of the good society. At the meso-level a critical tour through the valley of the shadow of the MOOC illustrates that in Ireland new models of online learning have generally failed to engender mainstream support from educators, politicians and policy-makers. Indeed, there is a notable gap in recent policy responses to the challenges and opportunities presented by the MOOC movement. At the micro-level an ecological perspective is adopted in the era of the MOOC towards the complex landscape of innovation and institutional change. A case study is reported of the experience of Dublin City University (DCU) in the strategic selection and carefully phased implementation of the new Academy MOOC platform. Throughout the paper the importance of agency and ability to skilfully border cross and navigate the contested terrain of online learning is emphasised to help shape the future trajectory of higher education.

Introduction

A central tenet of this paper is that the Massive Open Online Course (MOOC) movement is inherently political and part of wider social practice (Brown, 2016a). The concept of social practice recognises that the current language of crisis, disruption, democratisation and re-imagination in the age of the MOOC is entwined with much bigger issues over who controls the system, funding model and future of higher education. Accordingly, in reporting on the Irish MOOC experience this paper argues that we need to adopt a type of multi-layered bifocal perspective combining both political and pedagogical viewpoints in efforts to shape our preferred education futures. At a macro-level adopting the metaphorical lens of a telescope looking down on a deep mountain valley of the higher education system the paper reveals through critical discourse analysis both the light and dark sides of the MOOC movement. It illustrates how the MOOC is far more complex than simple dichotomies of good and bad as online learning is part of a much larger global landscape subject to powerful social, economic and technological change forces. At the meso-level, extending the above metaphor, when down in the valley of educational change the MOOC, and online learning more generally, is entangled in a complex landscape of policy, funding and institutional initiatives, which contain a number of contradictory positions. Through an analysis of recent Irish policy developments the paper illustrates how new models of online learning have generally failed to disrupt relatively traditional perspectives on the nature of higher education. Finally, the paper concludes by reporting at the micro-level how one Irish university is currently implementing an enterprise-wide MOOC initiative using a new soon to be formally launched platform. This experience demonstrates from an ecological perspective the importance of local agency in efforts to better understand and respond to the opportunities and challenges presented by new online models of higher education.

A macro-level perspective

This section adopts a bird's eye bifocal perspective through the metaphorical lens of a telescope to illustrate a number of competing and co-existing MOOC discourses. Based on the premise that 'It is theory that decides what we can observe' (Einstein; cited in Stachel, 2002; p.238) the intention is to provide a theoretical lens to help reveal some of the grand narratives, meta-level tensions and contradictions hidden in the current portrayal of the MOOC movement through popular media, policy texts and many of the current major platform initiatives. Put simply the discussion invites deeper analysis of both the light and dark sides of the MOOC movement to promote more critical debate over some of the choices facing us in uncertain times.

Imagine two people are standing on opposing mountaintops looking down through a telescope into the vast and deep valley of higher education. One sees sunshine; the other, shadow. Both are right (McGuire; cited in Brown, 2016b). Although overly simplistic this metaphorical image illustrates that there are two overarching worldviews shaping our understanding of the change forces influencing higher education: the perspective of the Knowledge Economy and the time honoured tradition of the Learning Society.

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Figure 1. The competing discourses of online learning (Brown, 2016a)

As Figure 1 attempts to illustrate, a type of double vision is required to see the two grand narratives imbued in the languages of persuasion (discourses) surrounding MOOCs. On one hand the growth of the MOOC has its roots in the contested terrain of globalisation, neo-liberal policies and the emergence of new labour models for the teaching profession (Peters, 2013). Arguably, many of the drivers for online learning promote laissez-faire principles of individual freedom, education as a personal commodity, and the ultimate goal of creating an unrestricted global market for higher education (Brown, 2016a). The drive to adopt new digital technology in education is not new as shown in this quote from President Bill Clinton:

> *Frankly, all the computers and software and Internet connections in the world won't do much good if young people don't understand that access to new technology means… access to the new economy (cited in Cuban, 2001; p.18).*

On the other hand the MOOC movement provides a real opportunity to disrupt old models, challenge the elite status of traditional institutions and address increasing global demand for higher education. As Daniel (2012) observes, it will not be possible to satisfy the rising demand for Higher Education, especially in developing countries, by relying on traditional approaches. More to the point, to quote the Irish President, Michael Higgins, in the traditional of the Learning Society, "Higher education has a crucial role to play in laying the foundations of a society that is more inclusive, participatory and equal" (cited in O'Brien, 2016).

Set against the background of these two overarching worldviews four distinct languages of persuasion are identified in the above framework as lenses or tools rather than truths to help interpret some of the competing and co-existing discourses. Notably, these discourses each draw on and borrow the language of open, online, digital, technology-enhanced, any time,

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anywhere e-learning but reflect quite different perspectives on the purpose, core function and future of higher education.

In the tradition of the Knowledge Economy, the Reproducing Discourse promotes higher education as the sifting agent and producer of human capital needed by the economy in the form of a skilled workforce. Accordingly, the discourse places strong emphasis upon mass education, quality standards and preparation for future employment (Brown, 2016a). Of course, it needs to be acknowledged that reproduction also serves an important role in promoting social cohesion and preserving cultural heritage.

The Reschooling Discourse reflects efforts to reform the traditional higher education system by advancing a new type of global curriculum through the language of disruption, modernisation and technology as progress. An inherent contradiction in this discourse is that major change forces champion greater creativity, innovation and entrepreneurship—yet many xMOOC initiatives perpetuate relatively monolingual instrumentalist views of higher education (Brown, 2016a). Moreover, they generally reinforce the elite status of traditional universities in the context of the global higher education market. While MOOCs are framed in the language of *learning for all* they promote the message that education is an individual commodity, which has a currency measured against conventional qualifications largely obtained from traditional on-campus models of instruction.

In contrast, the Deschooling Discourse reflects a constellation of perspectives sharing the view that traditional institutions are losing their monopoly on higher education. While the original cMOOC perspective was a form of deschooling and the new language of 'openness' promotes access, active citizenship and new education pathways in the traditional of the Learning Society, the discourse also supports unintentionally the goals of deregulation and the free market in keeping with the libertarianism of the wired (Brown, 2016a). For example, new unbundling initiatives and the emergence of digital badges may help to breakdown the Ivory Tower but they equally serve the agenda of a new global higher education market. The risk is that innovative educators seeking to re-imagine higher education in the tradition of the Learning Society may end up collaborating with the enemy. Thus, deschooling can embody a set of values quite different from education as a public good in which the State is responsible for reproduction of local culture and heritage and the provision of a strong education system.

The Reconceptualising Discourse builds on the original UNESCO pillars of learning—learning to be, learning to do, learning to know and learning to live together (Delors, 1996). In the tradition of the Learning Society it promotes life-long learning and skills and knowledge beyond mere preparation for work (Brown, 2016a). The focus is on active participation in all aspects of society and the new 2030 agenda of education for sustainable development (UNESCO, 2015). In the context of MOOCs the discourse shifts the conversation to more fundamental questions about the purpose of education itself. The basic premise is that higher education is an investment in actively shaping a more fair, equitable and socially just world.

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In summary, the truth is that although the MOOC is not a single entity most major online learning initiatives championed by the big players reflect the interests of the Knowledge Economy. What this means is the MOOC movement is simultaneously both good and bad. While the two overarching worldviews presented above are not mutually exclusive, and the bifocal perspective illustrates the need to move beyond crude dichotomies, the current preoccupation with higher education *in* change due to macro economic drivers and powerful technological forces would benefit from a paradigmatic shift to the language of higher education *for* change. The real question is what type of higher education system do we want new and emerging models of online learning to serve in the future? The answer to this question is unavoidably linked to broader social imaginaries and our ideas about the purpose of education and constitutes the good society. This line of thinking underscores the point that MOOCs should be in the service of big ideas rather than being the big idea itself (Brown & Costello, 2015).

A meso-level perspective

This section extends the original mountaintop metaphor by offering a meso-level perspective from within the valley of the shadow of the MOOC. It provides a metaphorical tour of the valley in the context of Irish higher education to illustrate how new models of online learning are entangled in a complex landscape of policy, funding and institutional initiatives, which contain a number contradictory positions. Despite the earlier statement by the Irish President, and the opportunity MOOCs invite to discuss bigger ideas about the future of higher education, in Ireland there has been very little serious engagement by educators, politicians and policy-makers in the potential of online learning for helping to develop a more inclusive, participatory and equal society.

Early MOOC initiatives

Ireland offers an interesting site for this type of analysis as according to *Forbes* magazine it has the distinction of hosting the world's first MOOC through the ALISON platform (High, 2013). A recent study on ALISON published by the European Commission's Joint Research Centre Science Hub (Souto-Otero et al., 2016) reports that the platform first established in 2007 has reached more than six million learners. Although not a recognized institution offering accredited qualifications, according to the company by December 2015 there were over 750,000 ALISON graduates worldwide. If this figure is accurate, then this makes ALISON one of the largest free online course providers.

The claim of being the first formally accredited Irish institution to offer a MOOC beginning in 2013 is shared by Dublin Institute of Technology, Hibernia College, and IT Sligo (Brown & Costello, 2016). It is interesting to note that despite these early initiatives the draft *Digital Roadmap: Phase 1* released in May 2014 (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2014), with the aim of building digital capacity in Irish higher education, made no explicit reference to MOOCs. Whether this was a deliberate decision at the time by the writing team is unclear. With the benefit of hindsight the absence

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of MOOCs from the draft Digital Roadmap is somewhat surprising, particularly since a section of the document reviews wider European and global developments (Brown & Costello, 2016). Moreover, the Digital Roadmap endorses the principles of open education to support future developments in higher education.

In May 2014, the National University of Ireland (NUI), an overarching body serving the interests of four member universities and several colleges, invited interested groups to tender on the feasibility of a collaborative National online education initiative, encompassing MOOCs, for the Irish university sector (Brown & Costello, 2016). A brief news item about this initiative featured in the *Times Higher Education*:

> *The new organisation, which would include Irish universities outside the NUI group, may begin by offering a series of MOOCs showcasing Irish education. Depending on the level of public interest, the organisation could then move into profitable accredited programmes (Powell, 2014).*

Although the tender closed in September 2014, and a written report was expected within several months of the project getting underway, to date there has not been any public statement in response to this initiative. It is known that a report was produced but this has never been widely circulated. However, before the tender process had closed, in June 2014 Trinity College Dublin (TCD) announced its intention to join the UK-based FutureLearn platform and to offer a MOOC later in the year on the theme of *Irish Lives in War and Revolution: Exploring Ireland's History 1912-1923.* Reportedly almost 14,000 people registered for this MOOC, which started in September (Kenny, 2014).

With the exception of this FutureLearn partnership, a project by IT Sligo to develop a MOOC for the transition between school and higher education, and an online professional development course offered by the Irish Law Society, apart from ALISON there have been no truly sustainable MOOC initiatives. Moreover, the results of a survey on MOOCs in Irish higher education institutions as part of a larger European study conducted in late 2015 shows that there is no single primary objective across the sector for adopting MOOCs (Brown & Costello, 2016). Of the three Irish institutions in this sample engaged in developing MOOCs the primary objective was spread between "Innovative Pedagogy", "Reach New Students" and "Increase Institution Visibility".

Recent policy initiatives

In April 2015, a more complete *Roadmap for Enhancement in a Digital World 2015-2017* was published to help advance a shared vision of "a [higher education] culture that fully embraces digital learning and digital innovation" (National Forum for the Enhancement of Teaching and Learning, 2015a, p.iv). Given the above discussion it is not surprisingly the updated Roadmap makes very few references to MOOCs, with this term completely absent from the Executive Summary. Although the Roadmap has other commendable features the initiative arguably favours more traditional campus-based models of higher education and does little to

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address a major barrier to the growth of online delivery. As Brown and Costello (2016) note the current model limiting off-campus delivery, due to little or no government financial support is at odds with recent European reports from the High Level Group on the Modernization of Higher Education (2014) calling for more inclusive funding approaches that help to open up education, develop more flexible modes of delivery, and diversify student populations.

Similarly, MOOCs do not feature in the *Digital Strategy for Schools: Enhancing Teaching, Learning and Assessment 2015-2020* (Department of Education and Skills, 2015) launched in October 2015 by the Minister for Education and Skills. Nevertheless, in January 2016 the same Minister was present to launch Ireland's first MOOC for teachers—a collaborative effort between Dublin City University, H2 Learning and Microsoft—on *21st Century Learning Design*. Even more recently the *Strategy for Technology-enhanced Learning in Further Education and Training 2016-2019* (Education and Training Boards Ireland | Further Education and Training Authority, 2016) fails to address the challenges and opportunities posed by MOOCs. This oversight or conscious decision is particularly surprising given the Strategy has a vision by 2019 of technology-enhanced teaching and learning providing greater access to further education and training, and moreover achieving positive outcomes for learners, enterprise, and wider society and the economy.

The disconnection between national policy initiatives and wider macro level MOOC developments in Europe and globally is particularly obvious in the *National Plan for Equity of Access to Higher Education 2015-2019* (Higher Education Authority, 2015) published in December 2015. MOOCs and the potential contribution of new models of higher education do not figure in this plan, and nor do they appear in Ireland's National Skills Strategy 2025 (Department of Education and Skills, 2016a) also launched by the Minister for Education and Skills in January 2016. Despite recognising that technology's pervasiveness means people of all ages increasingly need to be *technologically literate* in order to participate fully in society, referring to e-health, online banking and online supermarket shopping, there is no acknowledgement of the potential of online learning for improving lives, creating better places to live and work, and driving more sustainable economic growth.

The absence of MOOCs and new models of online learning more generally from the above policy documents no doubt explains why they do not feature in a recent comprehensive briefing paper for the new Minister for Education and Skills (Department of Education and Skills, 2016b). Thus, the reality of the situation is that currently in the Irish context MOOCs do not feature prominently in policy-level discussions and speculatively may even have been deliberately dismissed by influential educators and policy-makers as nothing more than a passing fad (Brown & Costello, 2016).

In summary, in the Republic of Ireland there has been no clear policy direction or nationally co-ordinated approach to the growth of the MOOC movement. Arguably, the policy gap around MOOCs is part of a bigger issue concerning the lack of government funding for

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online, off-campus, distance students, which in European terms remains a significant barrier to the goal of opening up access through more flexible modes of delivery to meet the needs of a diverse population. If, as the *National Plan for Equity of Access to Higher Education* states, "As a country we have everything to gain and nothing to lose by increasing levels of participation in higher education among all Irish citizens" (Department of Education and Skills | Higher Education Authority, 2015; p.i), then perhaps Ireland would benefit from a more strategic response.

The question is how should Ireland strategically respond to the MOOC movement? What role does a small nation state like Ireland have in the provision of online education in an increasingly globally connected digital world? Why would Ireland bother when there is already a plethora of MOOCs available to Irish citizens through major platform providers?

A micro-level perspective

This final section argues that to answer the above questions you have to be much deeper in the valley to fully understand the potential of the MOOC movement. Accordingly it describes a micro-level initiative by Dublin City University (DCU) to launch a major second-generation suite of MOOCs using a new platform known as Academy. In the absence of a national response, and after considerable deliberation, DCU has made a strategic decision to embark on an enterprise wide MOOC initiative using a new platform that has been developed over the last 18 months by Moodle HQ. This decision was not taken lightly. It follows a lengthy process of identifying the key institutional drivers for any such initiative and a review of existing platforms to evaluate their alignment and suitability in terms of the University's primary objectives (Brown, Costello, Donlon, & Nic Giolla Mhichil, 2015). Notably, the most influential factor in selecting Academy was the opportunity to build on our long history of innovation and in the case of MOOCs shape the design and future direction rather than be a client of an existing platform (Brown, Costello, Donlon, & Nic Giolla Mhichil, 2016).

Extending the valley metaphor through a more complex ecological perspective and understanding of change that draws on the concept of digital resilience (Weller & Anderson, 2013), the intention of DCU's Open Learning Academy initiative is create a "third space" to foster new innovations in teaching and learning. Such a creative space is intended to enable more agile and future-focussed responses to the opportunities presented by the rapidly evolving MOOC movement. Moreover, Academy is seen as a vehicle for promoting a step change in the current design and delivery of both existing online programmes and traditional face-to-face degree courses. In this respect the decision to implement Academy was influenced by the ability to transfer or border cross new found skills and knowledge in learning design back to the University's existing learning management system (i.e., Moodle). DCU is already a major leader in the use of Moodle in Europe and is the first institution in the world to adopt the new Academy platform.

The first MOOC on the new Academy platform known as "Head Start Online" was piloted in August 2016. This MOOC was designed after a synthesis of the literature and review of digital

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tools at other major online distance education providers (Brunton et al., 2016) to promote the readiness of prospective mature, part-time, online learners during the initial stages of the study life-cycle. Future MOOCs include a course on the Irish language and culture (Irish 101) along with three designed from a contemporary perspective to build on the 100-year commemoration of the 1916 Easter Rising. Three other MOOCs have been chosen for their focus on teacher education and explore Learning Leadership, 21st Century Skills for Teachers and Coding for Teachers. Future MOOCs are planned and already there is evidence of the benefits of working in a new platform that enables the University to be a future-maker rather than future-taker. In this respect this micro-level MOOC initiative is an investment in the development of digital resilience more generally across the University.

Conclusion

The future of the MOOCs is not a trivial matter. This paper has shown through a multi-layered metaphorical tour through the valley of the MOOC that online learning is part of wider social practice, which cannot be separated from deeper debates about the future of higher education. A critical discourse and policy analysis adopting a type of bifocal perspective at the macro and meso-levels helps to reveal some of the barriers, contradictory positions and powerful social, economic and technological change forces associated with the increasing drive (or not) to build digital capacity in the Irish higher education system. In reporting on the Irish experience most first generation MOOC initiatives have not been sustainable and appear to have taken place largely in parallel to more mainstream policy developments. Ironically in the so-called Silicon Valley of Europe the status of online learning remains somewhat messy and fragmented, which is unlikely to change unless the Government recognises the need to support diverse and geographically dispersed part-time online learners. That said, although the status of online learning remains uncertain and discussions about MOOOs need to go beyond simple dichotomies of good and bad, we have local agency to navigate, border cross and re-imagine our own pathways towards more equitable, socially just and preferred education futures. If micro-level MOOC initiatives such as the Open Learning Academy serve to highlight the current policy disconnection and lead to more inclusive funding models, which open up greater access to higher education, then they will have done the people of Ireland a great favour.

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THE STATE OF DISTANCE EDUCATION IN SOUTH AFRICA: AN ANALYSIS OF TRENDS, RESEARCH AREAS AND PUBLICATION VEHICLES

Jennifer Roberts, Institute for Open and Distance Learning (IODL),
University of South Africa, South Africa

Summary

Open distance learning research from South African authors represents only a small percentage of the body of distance education research that has been carried out. South Africa is home to one of the top ten mega distance education universities in the world and a recent South African government paper mandated that all higher education institutions consider implementing distance education units in addition to their face to face teaching. This paper investigates the state of distance learning research emanating from South African universities and categorises each paper into one of the broad research areas proposed by Zawacki-Richter in his 2009 study. In addition it provides an analysis of the South African distance education research trends and maps these against the trends that were identified in an article in the journal *Distance Education* by Zawacki-Richter and Naidu in 2016. Data for this research was obtained from the Scopus database of academic literature as well as from SABINET – the South African Bibliographic and Information Network. The classification of the research framework of Zawacki-Richter was analysed through the use of Atlas ti which provided a quantitative content analysis. The titles and abstracts of the South African authored articles were analysed using the Leximancer™ tool in order to map the trends. The results indicate that most distance education publications written by South African authors have been published in South African journals and are context specific to South Africa. These articles mainly address the micro level research area of practices and experiences of teaching and learning in an open distance learning environment. In addition the research indicates that there are very few articles that reflect the trends in the past five years of interactive learning, MOOCs and Open Educational Resources that were identified by Zawacki-Richter and Naidu.

Introduction

The academic field of distance education is a relatively new one and initially attracted a fair amount of criticism for its lack of theoretical frameworks, for being predominantly descriptive and for the use of poor research methodologies (Perraton, 2000; Bernard, Abrami, Lou, & Borokhovski, 2004). In order to address these deficiencies Zawacki-Ricter (2009) developed a categorisation of research levels and areas in distance education which was based on a literature review as well as a Delphi study. He proposed three levels of research levels in distance education further breaking them down into fifteen areas within these broad levels.

In addition, Zawacki-Richter and Naidu (2016) mapped out the research trends in the journal *Distance Education* since its inception 35 years ago, particularly exploring the keys themes as well as the semantic relationships between these themes during this time span.

Using the Scopus database, a search was conducted on all articles published on the theme of open and distance education (ODL) and online learning written in English from the social sciences and those articles written by South African authors were extracted which showed that only 1.5% of the articles emanated from South African institutions (497 articles out of a total of 33,838) (Table 1). Another indicator of the low number of articles from South Africa can be found when analysing the Turkish Online Journal of Distance Education (TOJDE). According to Ozarslan and Balabin-Sali (2012), of the total of 420 electronic articles published in the TOJDE from 2000 to 2010, only 2 of the articles were written by researchers at South African institutions.

Table 1: ODL publications from South African institutions as published in Scopus

Total no of ODL articles from Social Science published in English from 1980 to 2016 in Scopus	Total no of South African authored articles from Social Science published in English from 1980 to 2016 in Scopus	% of South African authored articles
33 838	497	1.5%

Source: Scopus, 2016

The question therefore is whether South African articles on ODL are not being published due to their content being at too low a level according to the levels proposed by Zawacki-Richter (2009), not keeping up with current research trends in ODL research as identified by Zawacki-Richter and Naidu (2016) or whether editors are not considering the worth of research being carried out in developing countries. This paper therefore attempts to provide empirical evidence required In order to address this question of the low levels of South African ODL research.

Literature review

In order to better understand the South African research environment, the important issues regarding the publication subsidy and reward system will be discussed. Research in South Africa is guided by the Department of Higher Education and Training (DHET) Research Outputs Policy (2015). This policy aims "to sustain current research strengths and to promote the kinds of research and other knowledge outputs required to meet national development needs" (DHET, 2015; p.3). The purpose of this policy is to encourage research outputs through a reward system which is paid to the public institutions of higher education. In order to qualify for the research subsidy that is paid by the DHET an article has to be published in one of the journals that appears on their accredited list. An updated list is distributed every year and South African journals as well as international journals are included in this accredited list. Up until 2015 this list included only three journals where the focus is entirely

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on ODL research. These journals are *Distance Education (DE),* which is published by Taylor and Francis under the auspices of the Open and Distance Learning Association of Australia (ODLAA), *the International Review of Research in Open and Distributed learning (IRRODL)* which is published by Athabasca University and *Progressio*, a local South African journal published by Unisa Press.

Progressio is a South African journal concentrating on open and distance learning (ODL) practice and is a vehicle for researchers and practitioners to publish their articles on open, distance and e-learning The journal has an international editorial board and is supported by the Commonwealth of learning (COL) as well as the National Association of Distance Education Organisation in South Africa (NADEOSA) (Unisa, 2016a). The journal has been available online since 1990 starting with Volume 21 and Issue 2. *Progressio* only received accreditation from the DHET in 2010, the result of which limited the number of articles that could be published by Unisa authors in any one issue. 75% of the articles need to be authored by researchers outside of Unisa. Historically most of the articles that were published in *Progressio* were written by Unisa staff members. This is not surprising as Unisa is the largest distance education institution in South Africa and employs the most number of academic staff of all the South African universities (CHET, 2013). Before *Progressio* received its accreditation of the DHET, most of the articles that were published were written by Unisa staff members. Because of the restriction non publications from Unisa since *Progressio* received its accreditation status, authors from other universities are starting to publish in this vehicle, most notably from North West University (SABINET, 2016).

Once restrictions were placed on the number of article that could be published in Progressio by local authors, there was a marked reduction in ODL outputs from South Africa. This was partially offset by a sharp increase in the number of ODL articles published in the Mediterranean Journal of Social Sciences in 2013 and 2014. This journal has subsequently been taken off the accredited journal list which has led to the decrease in ODL publications from South Africa.

Research areas in distance education

As a result of the criticism that has been made about the academic rigour of ODL research (Perraton, 2000; Bernard, Abrami, Lou, & Borokhovski, 2004). Zawacki-Richter (2009) developed a categorisation of distance education research areas. Based on both a literature review and a Delphi study, he proposed 3 levels of research areas as well as 15 areas which fitted into these 3 levels. He termed the 3 levels macro, meso and micro levels. Table 2 indicates the scope of each level as well as the different research areas that full within each level.

Table 2: Levels and areas of distance education research

Level	Scope	Research areas
Macro	Distance education systems and theories	1. Access, equity and ethics 2. Globalisation of education and cross-cultural aspects 3. Distance teaching systems and institutions 4. Theories and models 5. Research methods in distance education and knowledge transfer
Meso	Management, organisation and technology	6. Management and organisation 7. Costs and benefits 8. Educational technology 9. Innovation and change 10. Professional development and faculty support 11. Learner support services 12. Quality assurance
Micro	Teaching and learning in distance education	13. Instructional design 14. Interaction and communication in learning communities 15.Learner characteristics

Source: Zawacki-Richter, 2009

Research was carried out by Zawacki-Richter, Bäcker, and Vogt (2009) on articles published in 5 distance education journals, *Open Learning* (OL), *Distance Education* (DE), *American Journal of Distance Education* (AJDE), *Journal of Distance* (JDE) *and International Review of Research in Open and Distance Learning* (IRRODL*)*. They selected all the articles published between 2000 and 2008 (N = 695) and classified them according to Table 2. Table 3 shows the results of their classification according to frequency of research areas

Table 3: Zawacki-Richter et al.'s ranking of research areas by number of articles (N = 695)

Rank	Research area	Level	Frequency	%	Cum %
1	Interaction and communication in learning communities	Micro	122	17.6	17.6
2	Instructional design	Micro	121	17.4	35.0
3	Learner characteristics	Micro	113	13.3	51.2
4	Distance education systems and institutions	Macro	62	8.9	60.1
5	Educational technology	Meso	48	6.9	67.1
6	Quality assurance	Meso	41	5.9	72.9
6	Professional development and faculty support	Meso	41	5.9	78.8
7	Access, equity and ethics	Macro	31	4.5	83.3
8	Theories and models	Macro	24	3.5	86.8
9	Learner support services	Meso	23	3.3	90.1
10	Management and organisation	Meso	18	2.6	92.7
11	Research methods in DE and knowledge transfer	Micro	13	1.9	94.5
11	Globalisation of education and cross-cultural aspects	Micro	13	1.9	96.4
11	Innovation and change	Meso	13	1.9	98.3
12	Costs and benefits	Meso	12	1.7	100.0

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This research indicates that over 50% of all the articles addressed the research areas of interaction and communication, instructional design and learner characteristics all of which fall into the Micro-level. 16.9% of the articles were linked to the macro level and 38.5% of the articles related to the meso level. This research was carried out in 2008 and little research seems to have been carried out in more recent years to ascertain if this trend is still applicable in 2016.

Research trends in distance education

Many studies have been conducted to establish the trends that have emerged in ODL research (Howell, Williams, & Lindsay, 2003; Davies, Howell, & Petrie, 2010; Bozkurt, Agkgun-Ozbeck, Yilmazel, et al., 2015). One of the latest studies is the one that was carried out by Zawacki-Richter and Naidu (2016) which maps out the research arena for distance education over the last 35 years (from 1980-2014) in the *Distance Education (DE)* journal. They used a text-mining tool called Leximancer™ in order to investigate the main themes and relationships that were present over this period. They grouped the trends together in 5 years bans, starting from 1980-1984 and ending with 2010-2014. The Leximancer™ tool has been successfully used in other studies as well (Smith & Humphreys, 2006; Thomas, 2014). It is an automated system for content analysis and uses two different algorithms when extracting information – semantic and relational. Smith and Humphreys (2006) raised the concern of human decision makers' potential for subjectivity when assigning codes as well as the time consuming nature of coding. Thomas (2014) includes the problem of large numbers of documents which could or could not be important and also that many documents are unstructured and therefore difficult to research systematically. Leximancer™ is therefore a software technology which is able to automate complex and time consuming tasks associated with a content analysis.

Zawcki-Richter and Naidu (2016) found that the concepts of students, learners, course, instructional design and educational technology were common themes that run throughout all of the 5 year time periods. Figure 1 depicts the major topics covered in the articles published over the first 35 years of the Distance Education journal (1980–2014).The focus is on students, learners, course, instructional design, and educational technology which encapsulates the general thematic areas over that whole time period. Table 4 illustrates the results that they found in their investigation when dividing the whole period into 5 year time spans. From Table 4 it can be seen that the research trends emerging in the last 5 years, from 2010 to 2014 centre on interactive learning, OER's and MOOCs.

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Figure 1. Overall concept map of Distance Education articles from 1980 to 2014
Source: Zawacki-Richter and Naidu (2016)

Table 4: Themes in DE from 1980 to 2014 in 5 year time periods

Period	Theme	No of articles
1980-1984	Professionalization and institutional consolidation	56
1985-1989	Instructional design and educational technology	50
1990-1994	Quality assurance in distance education	56
1995-1999	Student support and early stages of online learning	75
2000-2004	The emergence of the virtual university	75
2005-2009	Collaborative learning and online interaction patterns	101
2010-2014	Interactive learning, MOOCs and OERs	102

Source: Zawacki-Richter and Naidu (2016) and Scopus (2016)

Methodology

When evaluating textual data, content analysis is judged to be an appropriate approach (Hsieh & Shannon, 2005). Stemler (2001) states that content analysis is a useful tool that can be used to examine trends and patterns that are present in documents.

Data for this research was retrieved from the Scopus database of academic literature (Scopus, 2016) as well and SABINET (SABINET, 2016) which is the South African Bibliographic and Information Network. Both databases were accessed through the Unisa library online service.

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All the major international DE journals are listed in the Scopus database and therefore it was accepted that this database would provide credible information for the purpose of this research. Many of the South African published journals are not listed on the Scopus database and these journals can be found on SABINET. As discussed in the literature review, only journals that are accredited by the DHET attract a subsidy reward and therefore for the purpose of this research, only the DHET accredited journals were included.

A search was carried out in each of these databases using the search variables of open and distance education, ODL, distance learning, open education, e-learning and online learning. The search was restricted journal articles only and to South Africa being the country of affiliation. Once the data was extracted it was then cleaned by two different coders. Certain articles were removed due to them not fitting the research criteria. There was also an overlap of journals that appeared on both the Scopus and SABINET lists, for example, the African Education Review (AER) and Perspectives in Education. The duplications were then removed. The final list was compiled and consisted of 316 articles where the main research topic was DE.

For the purpose of the first part of this research, that is the identification of research levels and areas according Zawacki-Richter's (2009) framework, each article was firstly coded according to the level (For the levels of research the macro level was coded a (a) the meso level a (b) and the micro level a (c) and then the research areas were coded according to Table 2. The coding therefore made use of pre-set codes which is often referred to as *a priori codes*. To ensure validity of the coding, 2 coders independently coded the articles according to the *a prioiri codes*. The researcher was the first coder and the second coder was a senior colleague at Unisa who is experienced in DE research. Coding discrepancy could easily arise because of the overlap between research areas. An example would be when ODL students from Unisa were the population of the research, which is very context specific and classified at the micro-level, but the research that was carried out could be classified at the meso-level if it addresses innovation and change. In order to address these coding discrepancies, 10% of the articles were randomly selected in order to evaluate the inter-rater agreement using the Cohen's's kappa (k) statistical measure (Cohen, 1960). Fleiss (1981; pp.38–46.) provided guidelines for characterising Kappas as follows:

Table 5: Fleiss's guidelines for kappa effect

kappa	Magnitude of agreement
<0.40	Poor
0.40 – 0.75	Fair to good
>0.75	Excellent

Source: adapted from Fleiss (1981)

The coding consistency between the 2 coders was $k = 0.697$ and therefore the inter-rater reliability can be accepted as good for the coding of the articles according Zawacki-Richter's (2009) framework for classification of distance education research.

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The second part of this research was to establish the trends of the South African DE articles over the past 35 years and to map them according to Zawacki-Richter and Naidu's (2016) article in the journal *Distance Education.* The earliest dated South African DE article was published in 1988 and therefore the time span for mapping the trends is 26 years and not 35 years. The trends were measured in 5 year time periods ending with the years 2010 to 2014. As a result the South African list was reduced from 316 articles to 266 articles as 50 articles were published in 2015 and 2016.

The title, abstracts and keywords of all 266 articles were used for the purpose of this analysis and Figure 2 presents the number of article published in each time period.

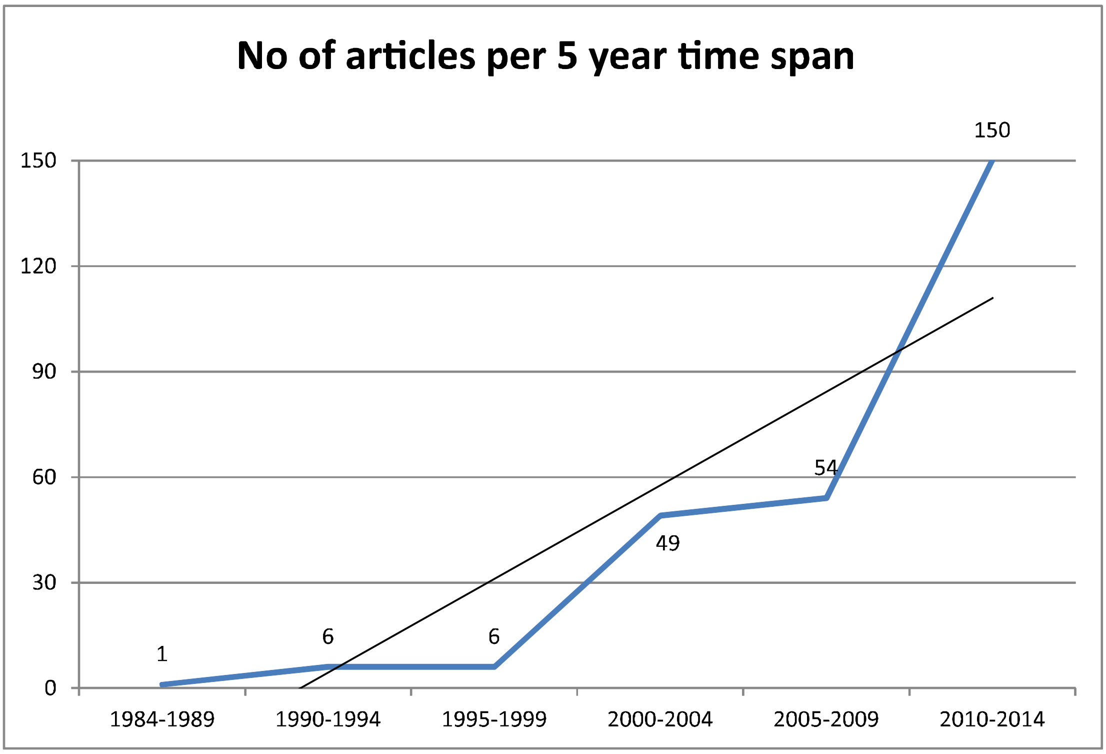

Figure 2. South African DE articles by year of publication

Figure 2 shows that there were very few DE articles published by South African authors in the 1990's. The growth in numbers commenced in the early 2000's and has grown exponentially since then.

An initial overall analysis was run with titles and abstracts of all 266 articles, in which common terms such as and, not, were excluded. The tool was requested to merge word variants such as distance and education or open and university. The software tool was used to analyse both the entire data-set (1988–2014) and the data for each 5-year time period separately. Because of the small number of articles that were published by South African authors in the period 1985 to 1999, these articles have not been analysed in their 5 year time spans as the results would be based on only a very small sample, therefore only the time periods of 2000-2004, 2005-2009 and 2010 to 2014 were analysed.

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Delimitations

It is acknowledged that the data used for this research has been taken from secondary sources (Scopus and SABINET) and therefore might not be fully representative of all the articles that have been published. In addition, because of the reward and subsidy policy of the DHET (2015), most researchers will only publish their articles in journals that are accredited by the DHET. Until 2016 only 3 lists were available for accreditation – the DHET list, the ISSI and IBNS lists. The Scopus list was only included into the list DHET accredited list of journal in 2016. Therefore it is possible that some authors decided to publish their articles in non-accredited journals, and chose not to be rewarded through the DHET subsidy.

In addition, each article was examined to ensure that it fitted into the discipline of DE. This was done by the author as well as the co-coder but it is always possible that a different researcher could have interpreted the criteria differently.

Data analysis

This article uses both the Leximancer™ tool as well as Atlas ti for analysing the articles that were selected for analysis for the purposed of this research. Atlas ti was used for the analysis of the classification of the articles according to 3 levels and research areas as put forward by Zawack-Richter's (2009) framework. In order to analyse the trends and relationships over the last 35 years and place them in 5 year time spans, the Leximancer™ automated analysis tool was employed. This is consistent with the analysis on DE research trends that was carried out by Zawacki-Richter and Naidu (2016).

Results are reported in descriptive tables, graphs and through frequency statistics.

Results

Table 6: Zawacki-Richter et al.'s ranking of South African research areas by number of articles (N = 316)

Rank	Research area	Level	Frequency	%	Cum %
1	Instructional design	Micro	86	27.2	27.2
2	Learner characteristics	Micro	65	20.6	47.8
3	Interaction and communication in learning communities	Micro	61	19.3	67.1
4	Professional development and faculty support	Meso	27	8.5	75.6
5	Learner support services	Meso	19	6.0	81.6
6	Management and organisation	Meso	16	5.1	86.7
7	Educational technology	Meso	15	4.7	91.4
8	Innovation and change	Meso	10	3.2	94.6
10	Quality assurance	Meso	7	2.2	96.8
11	Access, equity and ethics	Macro	4	1.3	98.1
12	Costs and benefits	Meso	3	0.9	99.0
13	Theories and models	Macro	2	0.6	99.6
14	Globalisation of education and cross-cultural aspects	Macro	1	0.3	100

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Table 6 indicates that just over 67% of the South African articles addressed research at the micro level compared to 51.2% as shown in Table 3. Fewer than 30% of the South African articles fall into the meso level (compared to 38.5% in Table 3) and the only 6 South African articles making up 3.2% of the total relate to the macro level. According to Table 3, the macro level of the articles from the top 5 DE journals is 16.9%. The main difference in these results lays in the lack of research from South Africa at the macro level and to a lesser extent the meso level. With over 67% of the South African articles addressing the micro-level, this is proof that South African researchers are not "playing in the major league" due to the predominance of their research being carried out in the micro level.

A glaring omission from the South African authors is that there were no articles at all on *DE systems and Intuitions* or on *Research methods in DE and knowledge transfer*. Although the number of articles from Zawacki-Richter et al's (2009) in these 2 research areas are also relatively low it is still a stark fact that South Africans have not researched them at all.

These statistics indicate that the vast majority of South African articles address the micro level of ODL research and that the top research area is *Instructional design*, followed by *Learner characteristics* and *Interaction and communication in learning communities.* There are only two South African articles that speak to *Theories and models* and none that address the research area of *Research methods in DE and Knowledge transfer*.

Table 7 excludes the local South African based journals as well as discipline specific journals and provides information that only relates to the dedicated DE journals *Distance Education, International Review of Research in Open and Distributed Learning (IRRODL)* and the *Turkish Online Journal of Distance education (TOJDE)*. This is in order to make a comparison with Table 3. There were no South African articles published in *Open Learning*, (OL), *American Journal of Distance Education* (AJDE) or *Journal of Distance Education* (JDE), probably because these journals are not recognised by the DHET for accreditation purposes.

Table 7: Zawacki-Richter et al.'s ranking of research areas for South African publication in DE, IRRODL and TOJDE by number of articles (N=36)

Rank	Research area	Level	Frequency	%	Cum %
1	Instructional design	Micro	8	22.2	22.2
2	Interaction and communication in learning communities	Micro	7	19.5	41.7
2	Professional development and faculty support	Meso	7	19.5	61.2
3	Innovation and change	Meso	4	11.1	72.3
4	Management and organisation	Meso	3	8.3	80.6
4	Learner characteristics	Micro	3	8.3	88.9
5	Globalisation of education and cross-cultural aspects	Macro	1	2.8	91.7
5	Costs and benefits	Meso	1	2.8	94.5
5	Educational technology	Meso	1	2.8	97.3
5	Learner support services	Meso	1	2.8	100

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When only looking at the three above mentioned international distance education journals, the picture changes slightly. 50% of the articles are pitched at the micro level and almost 44% address the meso level. This compares relatively well with the finding from Zawacki-Richter et al.'s (2009) that was presented in Table 3. This illustrates the fact that when South African authors publish their articles in international journals, there is a more even spread of research levels between the meso and micro level. However, even when publishing in international journals, the area where the South African are lagging behind is in the macro-level.

Figure 3 shows the breakdown of South African articles by journal. The acronyms for these 2 graphs are presented in Table 8

Table 8: Acronyms for journals

Acronym	Journal	County of publication
AER	African Educational review	South Africa
DE	Distance Education	Australia
IRRODL	International Review of Research in Open and Distance Learning	Canada
Med	Mediterranean Journal of Social Science	Italy
OL	Open Learning	United Kingdom
Pers in Ed	Perspectives in Education	South Africa
Progressio	Progressio	South Africa
SAJE	South African journal of Education	South Africa
SAJHE	South African Journal of Higher Education	South Africa
TOJDE	Turkish Online Journal of Distance Education	Turkey
Other	Other (mainly discipline specific journals)	Various

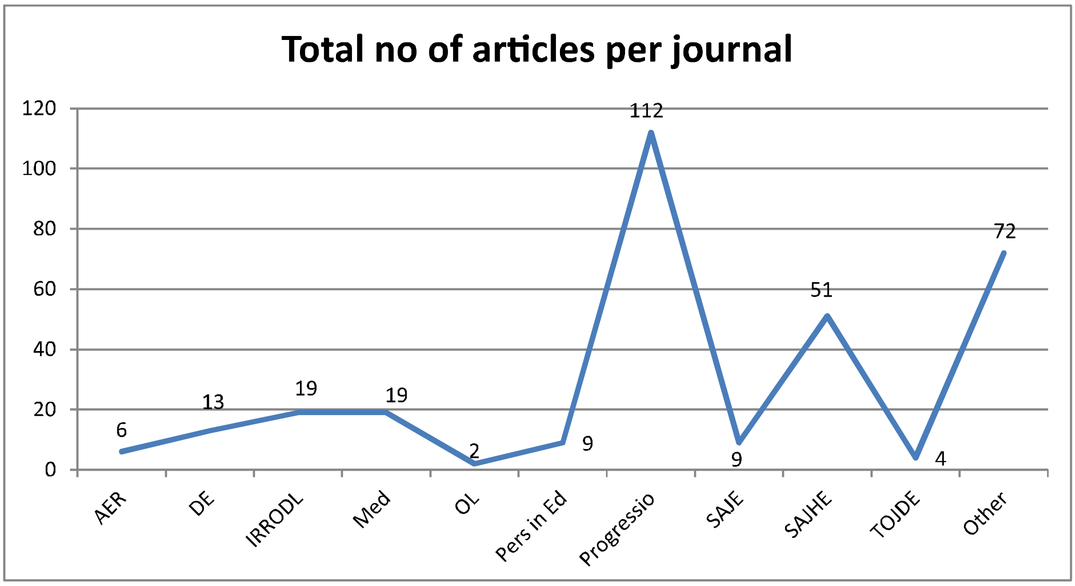

Figure 3. Number of South African DE articles by journal

Figure 3 indicates that most frequently used vehicle for publishing South African articles (n = 112) is the local journal, Progressio. This is followed by articles published in discipline specific journals (n = 72). The most popular disciplines here include computing, library

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science, and medical as well as accounting. In third place is another South African journal, *SAJHE*. *SAJHE* is not discipline specific to DE research but is the journal for all articles on Higher Education in South Africa. The leading international journal for South African publication is *IRRODL*, followed by *DE*.

The discipline specific journals are mostly published in South Africa but that is not always the case. If we exclude the discipline specific journals then only 55 out of 244 articles (23%) have been published in international journals.

At this stage it is prudent to look a bit deeper at the data in order to establish the levels of research in the various journals and Figure 4 addresses this.

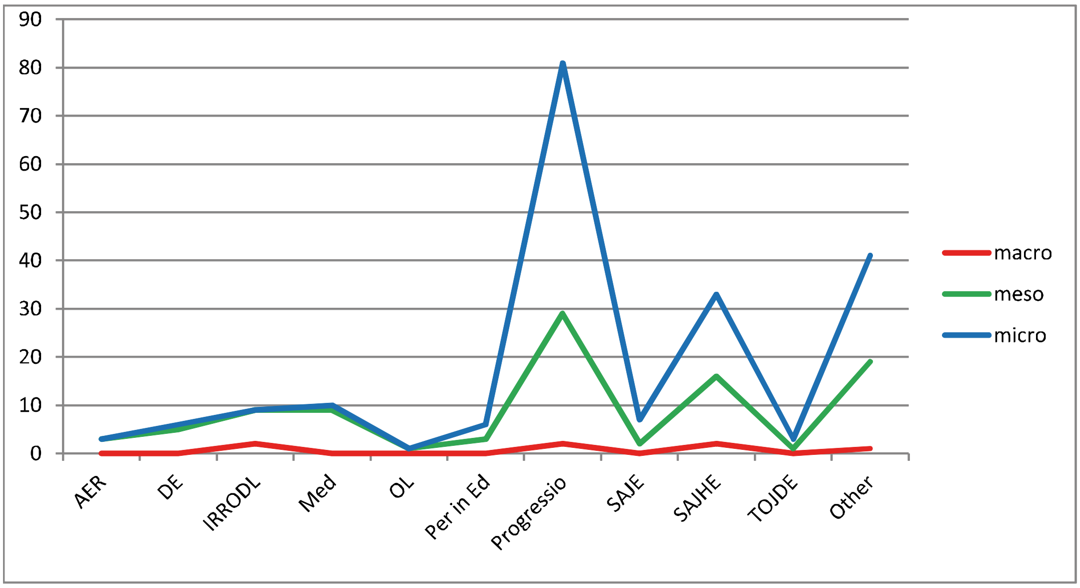

Figure 4. Number of South African articles by journal according to level

From Figure 4 it can be seen that the journal with the highest number of DE articles is the locally published journal *Progressio* which was discussed under the literature review. However, it can be seen that the South African published journals show the biggest gap between the levels of research. The articles published in the international journals all have an almost equal mix of meso and micro level articles, *whereas Progressio, SAJHE, SAJE* and the discipline specific journals show a much higher level of micro level articles.

Figure 5 shows the number of ODL articles published from each university/institution in South Africa and the acronyms for each university are shown in Table 9.

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Table 9: Acronyms for South African universities

Acronym	University
CPUT	Cape Peninsula University of Technology
CUT	Central University of Technology
Free State	University of the Free State
SUN	Stellenbosch University
Unisa	University of South Africa
UKZN	University of KwaZulu-Natal
UP	University of Pretoria
WITS	University of the Witwatersrand
NWU	North West University
Other	Other and author affiliation not established

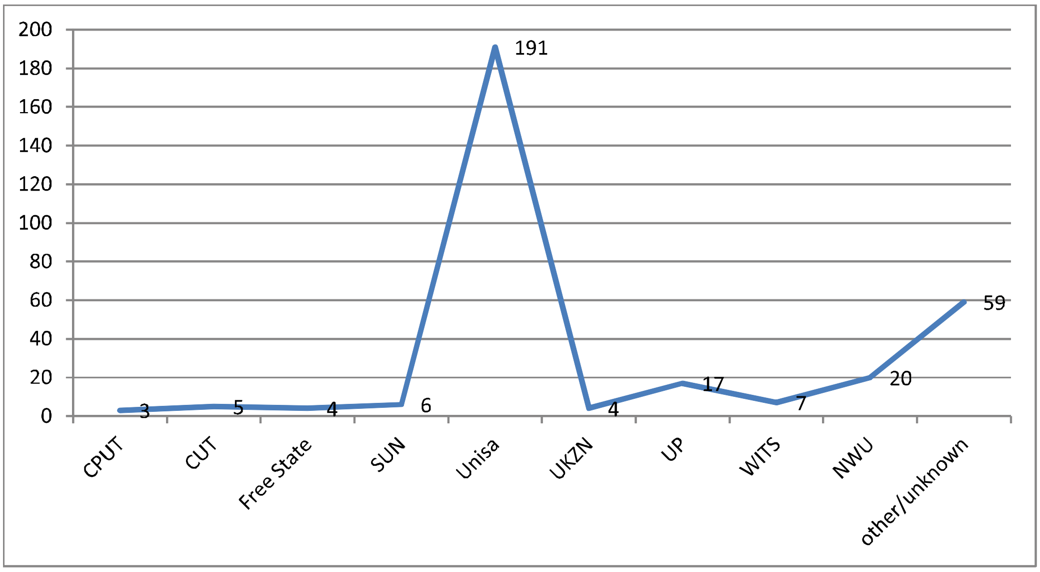

Figure 5. Number of DE articles by University/Institution

It is not surprising that Unisa has produced the highest number of DE articles because the university is the only full DE University in South Africa. However, the government white paper on distance education (DHET, 2014) encourages all institutions of Higher Education to develop DE units. Many of the universities already have Centres for Distance Education so it is expected that more DE research will emanate from them in the future.

Data analysis – Trends

Firstly an overall analysis was run using all the titles, keywords and abstracts of all 266 articles that were identified as being written by South African researchers on the broad topic of DE from 1988 to0 2014. Figure 7 depicts graphically the major topics that emerged from this overall analysis and also includes the number of hits that each concept scored.

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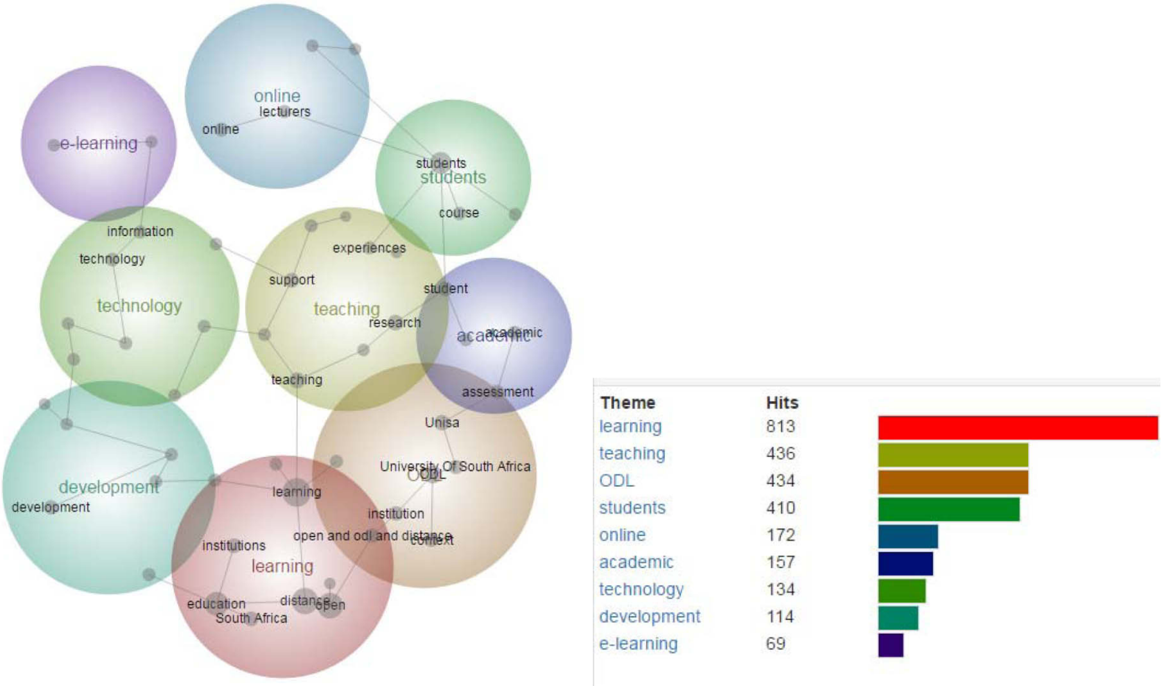

Figure 6. Overall concept map analysis of themes from 1988 to 2014 using Leximancer™

It is not surprising that the themes of ODL and distance learning were the most prominent, which were connected to Higher Education institutions and South Africa, as this is the theme of the analysis of this research. In addition the themes of students, learning and teaching also feature strongly. Within the student themes, links are made with assessment, student support and experiences. A particular theme of *Development* was identified which is encouraging to see as South Africa is seen as a developing country and the theme of development is a necessary one. Technologies, linked to e-learning and online learning also emerged as prominent themes. The findings tie in with the results obtained from the research levels and areas analysis of Zawacki-Richter (2009) and presented in Table 7 above.

Figures, 7, 8 and 9 display the results of the themes identified by Leximancer™ according to the 3 time periods of 200-2004, 2005 to 2009 and 2010 to 2014.

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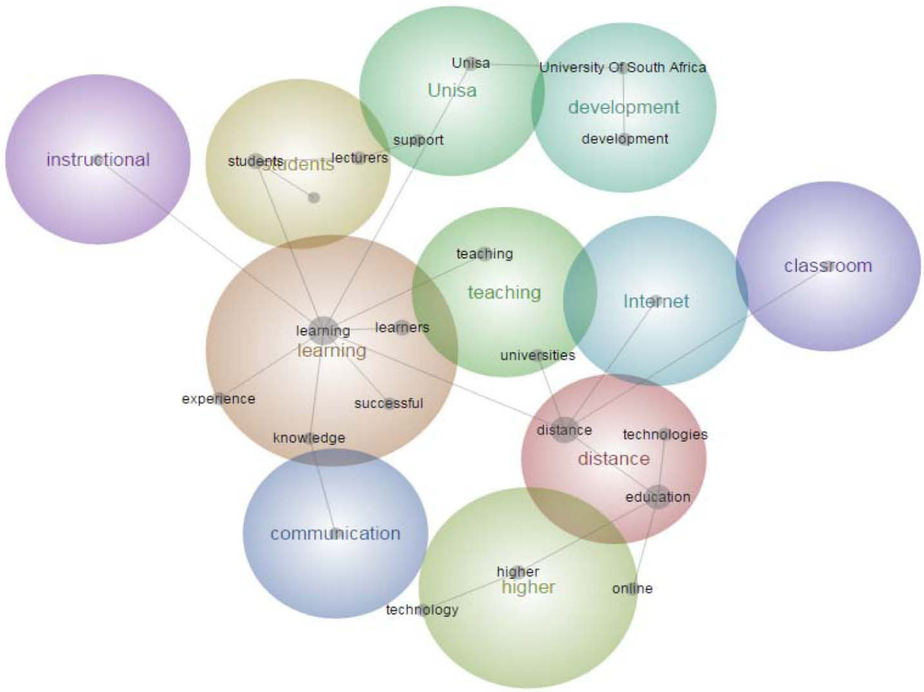

Figure 7. Analysis of themes using Leximancer™ 2000-2004

Figure 7 depicts graphically the important themes that emerged during the period 2000 to 2004. The emphasis of the research was rooted in the themes of, learning, students, instructional design and development. During this same period the articles in *DE* were concentrated around the theme of the emergence of the virtual university and this theme does not feature at all in the South African publications.

From Figure 8 it can be observed that during the period 2005 to 2009, themes around online learning and e-learning as well as assessment started to emerge. Online interaction patterns appeared as the major topic for research in the same time frame in *DE* so the inference can be drawn that *DE* researchers were at a more advanced stage of online research than their South African counterparts, although the South Africans were just entering the field.

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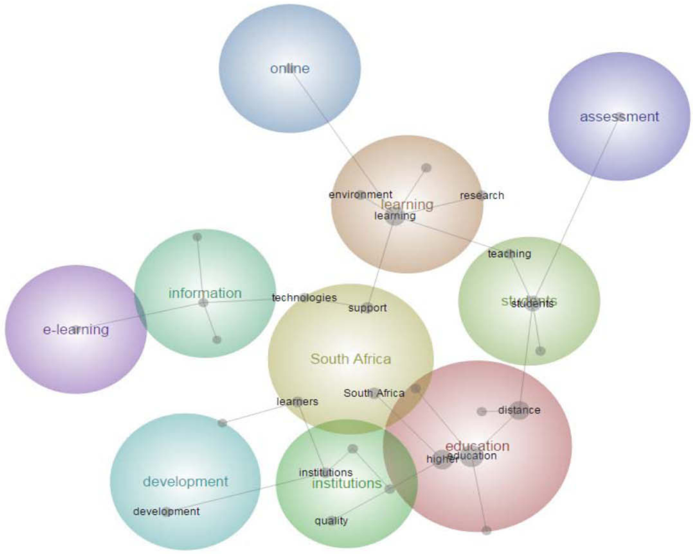

Figure 8. Analysis of themes using Leximancer ™ 2005-2009

The final analysis carried out using the Leximancer™ tool was for the period 2010 to 2014 (Figure 9). The emerging themes from the *DE* journal were interactive learning, OER's and MOOCs. Although there were a small number of South African articles published on these themes, there were not enough to even warrant a small finding on Leximancer™. Once again the South African publications continued to centre on the themes of students, learning, e-learning and online learning, as well as development and technologies.

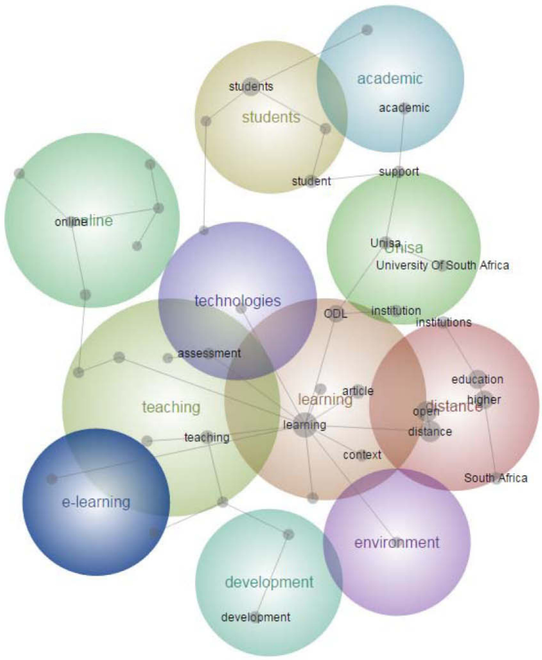

Figure 9. Analysis of themes using Leximancer™ 2010-2014

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Conclusions and recommendations for further research

This research paper seeks to explain the low levels of DE publishing in South Africa. Unisa is the oldest open distance education university in the world (Unisa, 2016c) and one of the top 10 mega distance universities (Daniel,1996). Despite this fact South Africans have contributed very little to theorising DE or even critiquing those who have theorised it who are mainly from the global North. Many South Africans are quick to lay the blame on the editors of the international DE journals who act as gatekeepers for publishing articles in their journals. This might indeed be the case in some instances, but it can be seen from this empirical research that the levels of research emanating from the South Africans are disproportionately represented at the micro level and that research at the macro level is almost non-existent. Although internationally most research is also pitched at the micro level, the South African researchers seem to be unable, unwilling or lacking in experience to produce original research which displays a theoretical understanding of DE. Most articles tend to "ride the same old horse" and revolve around the concepts of lecturer and student perceptions and the digital divide. Zawacki-Richter and Naidu (2016) mapped the trends in DE publishing and found that the most common themes emerging in the last 5 years were centred around Open Educational Resources (OER's), MOOCs and interactive learning, yet very few articles from South Africa have been published on these topics. In fact, during the period 2010 to 2014, the South African articles were still sticking to the research areas of technologies, e-learning and online learning as well as student support

The problem however does not seem to be confined only to the South African context but would seem likely to be prevalent among many developing countries. According to Scopus (2016) India has only published 4 articles in *DE* and none in *IRRODL*. The most popular journal for the Indian DE publications is *TJODE* which has published 40 articles. Two articles from Indonesia have been published in *DE* and only one article in *IRRODL*. This however, is only taking into account articles that are published in the English language so comparisons with other developing countries such as Brazil, China and Russia have not been researched.

These finding have significance for those people who are mandated to improve the quality and number of DE publications at the various universities in South Africa. At Unisa, the Institute for Open and Distance Education (IODL) is "an academic unit charged with the responsibility to undertake pragmatic and reflexive research including the organisation and professional research training programmes in order to strengthen ODL practice and benchmark it against global ODL practices" (Unisa, 2015). Unisa's ODL policy document (Unisa, 2015) states that "research should be carried out in many areas including the formulation of ODL theoretical explanations for ODL phenomena". It is clear that specialised units such as the IODL at Unisa and corresponding units at other South African universities need to take cognisance of these findings and incorporate higher level ODL research and trends in DE research into their research training programmes.

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SCALING LEARNING ANALYTICS: THE PRACTICAL APPLICATION OF SYNTHETIC DATA

Alan M. Berg, Stefan T. Mol, Gábor Kismihók, University of Amsterdam, Netherlands,
Niall Sclater, Sclater Digital Ltd, United Kingdom

Summary

This case study is based on experiences gained during the running of a two-day data hackathon around large scale Learning Analytics infrastructure at the LAK16 conference. The main conclusion is that there will be a significant demand for realistic synthetic data to support the development of large scale infrastructures.

Synthetic data overcomes ethical barriers to sharing large data sets between different (parts of) organizations. Properly simulated synthetic data can be leveraged to fine tune algorithms deployed within the field of Learning Analytics. This data driven approach lowers the risk of accidental disclosure and bypasses limitations rightfully imposed due to legal and/or ethical constraints associated with real student data. The application of synthetic data to performance testing allows universities to develop highly scalable infrastructure in parallel to developing central data governance practices.

This short paper explores the conformance testing of Learning Record Stores (LRS – secure locations to store and query student digital traces), discusses the implications for Universities around a specific set of xAPI recipes (Berg, Scheffel, Drachsler, Ternier, & Specht, 2016) and generalizes practices for the acceleration of large scale deployments of LA infrastructure. The authors argue that by applying a standardized set of synthetic data based on a peer reviewed synthetic data generator, universities will find it easier to develop reliable recipes for digital learner traces. Consistent data storage across university boundaries will subsequently enable the benchmarking of algorithms that consume student digital traces and support the generation of predictive validity evidence across university boundaries. Thus universities can compare the value of their algorithms relative to other universities and consistently apply algorithms when students transfer.

The relevance of synthetic data in Learning Analytics

Synthetic data, also known as simulated data, has been heavily researched and successfully applied across a broad range of scientific fields. Berg, Mol, Kismihók, & Sclater (2016) have previously discussed the application of synthetic data within the field of Learning Analytics.

Based on experiences developed through the UvAInform project (Kismihók & Mol, 2014) at the University of Amsterdam, that involved the development and conduct of seven pilot experiments built onto a central Learning Record Store, the following reasons to deploy synthetic data were identified:

Synthetic data can:

- Enable the parallel development of data governance processes while developing infrastructure without exposing real data.
- Populate performance tests with realistic load patterns.
- Potentially support the development of benchmarking across organizations without the release of a real data set
- Populate a training environment without ethical or security risks.
- Enforce best practices by codifying conformance tests.

LA infrastructure

The LAK 16 data hackathon (2016) brought together two organisations leading the way worldwide in developing open architectures for learning analytics. Jisc (2016) represents the UK further and higher education sector and is a not-for-profit organisation for digital services and solutions, and Apereo (2016) is a foundation that supports the development of Higher Education open source software. The hackathon put the growing ecosystem of learning analytics products such as learning records stores, learning analytics processors, dashboards, consent systems and student apps through their paces with synthetic big data from learning management systems, student record systems and other sources.

The motivation was to test the interoperability of the various tools, and to integrate new data sources, predictive models, and third party products to help to reassure institutions that they are not going to be locked into proprietary learning analytics systems and that they will be able to select the best products for their needs. xAPI, an emerging standard for the exchange of learning records, was the basis of efforts to develop new profiles, which are also known as *recipes* (Scheffel, Ternier, & Drachsler, 2016) and applications for learning analytics.

Jisc provided the infrastructure based on their national learning analytics architecture (Sclater, Berg & Webb, 2015) and test data, which was then converted to xAPI calls via an open source tool running in specially crafted test plans. The data that drove the test plans was synthetic, however, the distributions were based on captured digital traces. The main technical artifact was a secure repository for digital traces mostly from students. The repository receives the traces via the xAPI protocol and is queried by the same protocol.

Figure 1 displays one of many possible realistic infrastructures. Digital traces are captured through javascript libraries in web pages. Student Dashboards query the LRS and so does a data warehouse. Within the data warehouse, Machine Learning Algorithms are applied that

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generate predictions about the students. Dashboards can then query an Educational API about the results from the algorithms. The Educational API queries the data warehouse.

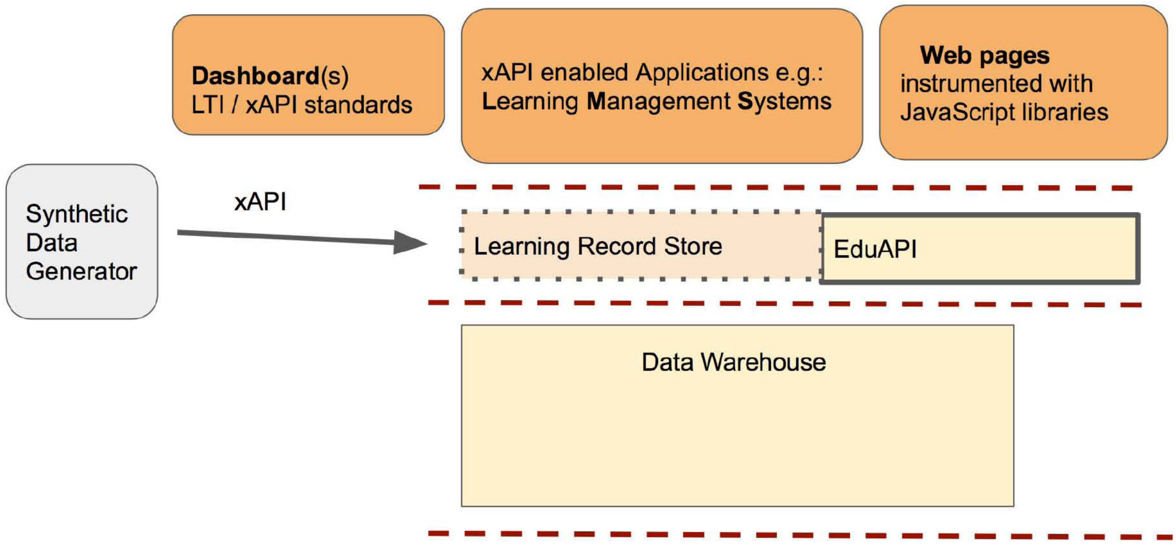

Figure 1. Simplified LA Infrastructure

By tasking a Synthetic Data Generator (SDG) to populate the Learning Record Store one can simulate the student activity and test the conformance and performance of the infrastructure without real users and their "real" xAPI traces. When necessary the SDG can also generate synthetic Student Information System input for the data warehouse. The data that drove the SDG for the hackathon was fully artificial based on a dataset released by Jisc which resides in the Hackathon github repository (2016). The Jisc dataset was itself synthetic based on real usage. However, as more datasets are made available, the data can be analysed, real distributions of usage deducted and then encapsulated directly into the test plans. In other words, the more datasets, the better the fidelity and generalizability of the data generated by the SDG.

The authors choose Jmeter (2016) as the basis for the Synthetic Data Generator. The application is open source software, a 100% pure Java application designed to load test functional behaviour and measure performance. Jmeter was chosen because it:

- is open source, hence the code is open to review, re-use, and alteration;
- has a rich feature set so one can, out of the box, write test plans that deliver complex datasets;
- is extendable through a scripting language; so if necessary one can extend the richness of datasets programmatically;
- is a mature product with a considerable amount of documentation and usage;
- has a drag and drop GUI which simplifies test plan creation;
- is data driven, e.g. one can modify the tests simply by changing CSV files;

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- has a master slave architecture so can scale to extremely high loads e.g. one Jmeter application can run many other Jmeter applications across a server park;
- enables the repurposing of conformance tests as performance tests.

Jmeter runs test plans which are designed in a GUI interface and saved in XML format. Figure 2: displays a hackathon test plan. On the left hand side of the GUI are elements that perform one specific task well. On the right hand side is the configuration for a highlighted element. The majority of the elements in the test plan, specifically the elements in the top left corner read in CSV files containing data about user names, course ids. The data is necessary to send meaningful xAPI requests with a diversity of detail to the Learning Record Store. The element highlighted converts the one line of inputted data into a well formed HTTP REST request. Jmeter can run many requests at the same time, when necessary generating a considerable amount of load even from one machine. As noted above, one of the motivations for choosing Jmeter was the wealth of documentation. A Google search with the term "how to do performance testing using Jmeter" returns around 300,000 results.

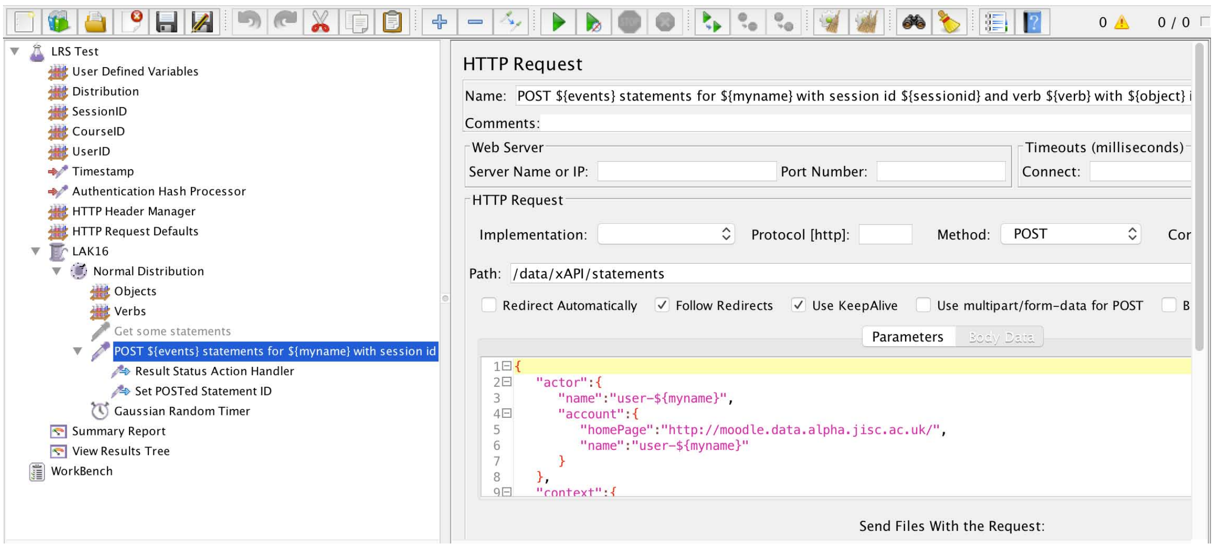

Figure 2. Jmeter test plan

In return for the mild complexity, the test plan generated a rich set of xAPI recipes that were subsequently used to populate a number of different commercial Learning Record Stores during the hackathon. The Learning Record Stores followed the xAPI specification (2016), but responded subtly differently to the requests. The conformance tests helped isolate a number of unexpected behaviours which were then rapidly repaired during the hackathon.

A single Jmeter instance also populated the main LRS with over 400,000 records within a 30-minute period, delivering confidence that the test infrastructure could withstand unexpected load. The quality of the data was limited by the lack of variety in the Jisc dataset. As usage increases on the Jisc experimental national infrastructure the authors expect the richness of xAPI recipes to also increase and thus motivate further improvement in the open-sourced test plans. The test plans did not include population of the data warehouse, however Jisc have released examples of the necessary format, see Jisc data (2016).

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If the same test plan is applied across organizational boundaries then the assumption is that the same xAPI recipes will also be applied across boundaries, leading to greater standardization and consistency. For example, one could consider deliberately limiting the conformance tests to work only with the Dutch xAPI Specification for Learning Activities (DSLA) or a formalized international equivalent. If the SDG fails to generate the data needed for a given dashboard or algorithm within the target infrastructure, then it is clear that the infrastructure is not conformant and would require subsequent effort for other organizations to share data and perform joint research on that data.

Roadmap

The SDG is at an early stage of development. The code resides in a public Hackathon github repository (2016) open to review, modification, and extension. To improve the initial simplistic test plans requires the gathering of requirements, the exploration of real data, and an agreement on which xAPI recipes to apply.

The wish list of improvements includes:

- An improved generation of distributions of xAPI recipes per student cohort. For example, finer grained division over a wide range of student cohorts.
- A complete set of conformance tests for Learning Record Store vendors.
- A thorough application of xAPI recipes intended to be consistent across organizations.
- Documentation for the deployment of the SDG.
- Extension of the SDG to standardized SIS data formats.
- The development of a benchmark for LA algorithms based on SDG data.

Conclusions

From the experiences garnered from the UvAInform project and the LAK16 data hackathon the authors argue that by applying a standardized set of synthetic data based on a peer reviewed SDG, universities will find it easier to develop consistent recipes for digital learner traces. Consistent data storage across university boundaries will later enable the benchmarking of algorithms that consume student digital traces supporting the insurance of predictive value across University boundaries. Thus universities can compare the value of their Learning Analytics algorithms relative to other universities and apply consistently the algorithms as students transfer.

An example SDG was provided for the LAK16 hackathon. The tooling is well documented and open source. Although basic the test plans are free to use and update.

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INTEGRATION OF LEARNING ANALYTICS IN BLENDED LEARNING COURSE AT A UNIVERSITY OF TECHNOLOGY

Kristie Naidoo, School of Education, Durban University of Technology,
Richard Naidoo, College of Graduate Studies, University of South Africa, South Africa

Abstract

The main purpose of this study is to use Learning Analytics to improve the instructional design in an undergraduate Mathematics Education I course. Students enrolled in the course come from varying backgrounds. The Learning Analytics will improve the flexibility of the course and provide a platform to understand misconceptions experience by the students. The integration of computational aspects is necessary to illuminate teaching learning and assessment in a Blended Learning setting.

A Blended Learning model is used to teach first year undergraduate mathematics education I course at the School of Education, Durban University of Technology. Students were taught a course in mathematics using a Learning Management System.

Data is constructed using items from the discussion forum on Black Board and a post assessment task given to 170 first year Mathematics Education I students. Four levels of Learning Analytics: descriptive, diagnostic, predictive and prescriptive are used to discuss the data set.

Activity theory is used as theoretical framework. Mixed methods were used to analyse the quantitative and qualitative data.

Student errors from the post-test are categorised as cognitive errors with structural errors, arbitrary errors and executive errors to establish links with pre-knowledge frames and concept representation. The structural errors indicate that the representation of concepts is necessary in the content design of the course.

Results show that there are more structural errors than executive and arbitrary errors.

Introduction

Using Blended Learning in an undergraduate mathematics course provides opportunities to improve the instructional design to help students minimise errors. This study focuses on errors in basic trigonometry using a Blended Learning format. The essential elements of the learning involve a didactic contract referred to by (Gür, 2009) in a study at Turkey on Trigonometric Learning.

The study applies learning analytics to examine the students understanding of the concepts.

Learning Analytics

Analytics is the process of discovering, analyzing, and interpreting meaningful patterns from large amounts of data (Jindal, 2015). Analytics is usually defined, in practice as any fact-based deliberation which leads to insights (diagnostics) and possible implications for planning future action in an organizational set up (Banerjee et al., 2013)

Descriptive analytics provide a rich data source to measure, compare and improve individual performance. A Learning Management System (LMS) affords functionality to follow or trace student activities and capture data sets to help improve the learning experience. (Norris et al., 2009) is of the view that analytics that besides using quantitative analysis, the qualitative view will provide additional insight to aid the design of the course offering.

Diagnostic analytics provide relevant data to on why students experience these types of errors and misconceptions. In a Mathematics education course such data will allow the designer of a course to alert students of certain obstacles in their learning path early enough to motivate to correct them and improve their effort.

Prescriptive analytics refers to what should be done about such errors and misconceptions. Blended Learning strategies offer other opportunities to assist students in their effort to minimise errors.

Predictive analytics are used forward planning. (Raj, 2014) suggests that analytics can be used for favourable planning using a combination of data about who, what, where, and when and analyzing why and how. Predictive analytics give a glimpse into the future. It can be used to make changes to course content based on data from the descriptive and diagnostic analytics

Figure 1 is adapted from a business model (Banerjee, 2013)

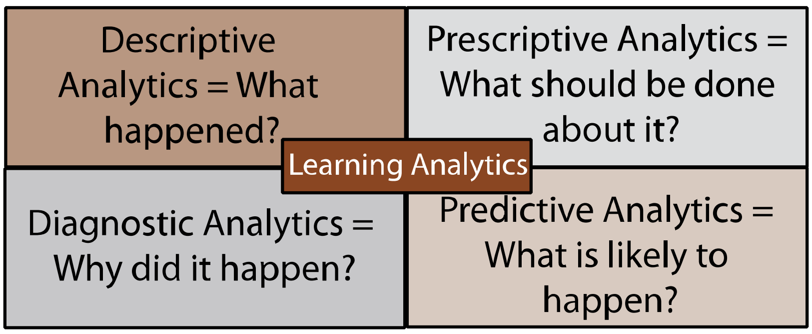

Figure 1. Types of Learning Analytics

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Activity Theory Framework

The Blended Learning model is conceptualised using the Activity Theory (AT) (Vygotski, 1962). This is an artefact-mediated and object-oriented model. Research shows (Barab et al., 2004) and (Karasavvidis, 2009), that AT can be used as theoretical and an analytical framework for examining design and development of technology-supported human-computer interaction, and online and blended learning communities.

The six component of an Activity System, (Engestrom, 1993) are subject, object and related outcomes, mediating tools and artefacts, community or communities, division of labour and rules.

In our project the subject is the student or class group from the MTMC 101 undergraduate course. The object and the related outcomes are the actual online material the student examines in this course and what the material intends to achieve, how these activities transform the student or class group. The online tools, learning resources and conceptual theory used to facilitate the mediation between subject and object. The community is the individual student or the class group. Division of labour: All members of the community do all aspects of the work. The rules are all the implicit regulations, norms and standards that regulate the activity within the system.

(Russel, 1997) describes an activity system as "any ongoing, object-directed, historically-conditioned, dialectically-structured, tool-mediated human interaction". A schematic representation of the Activity System used in this project is given below:

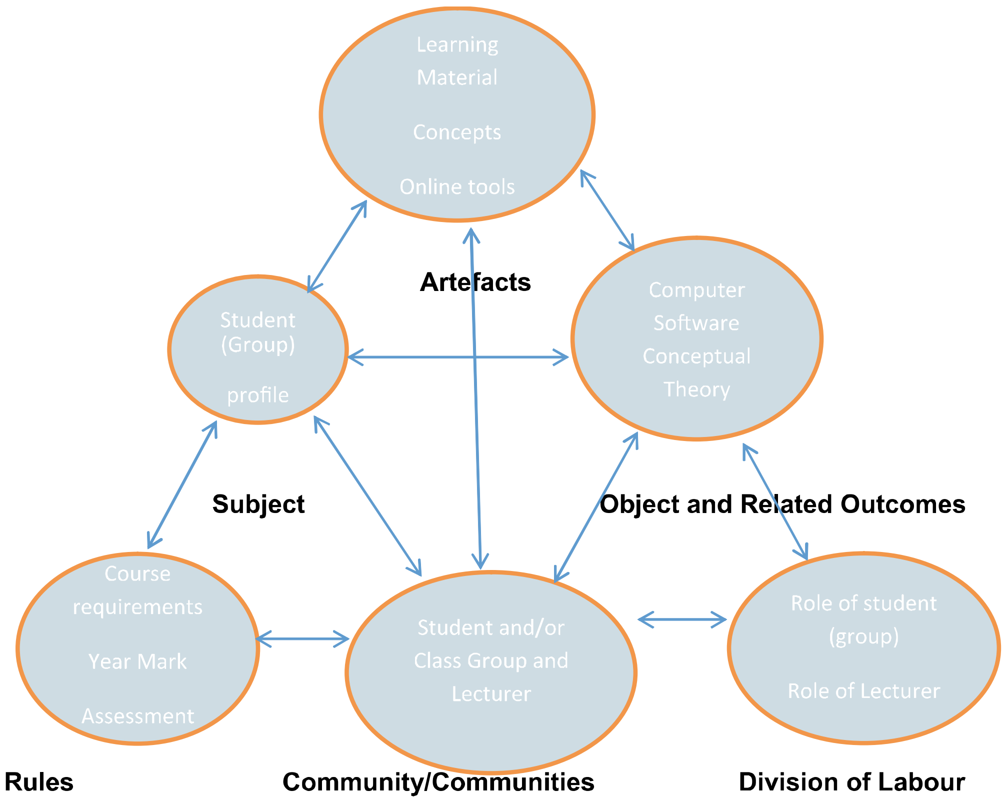

Figure 2. Model of activity system (Adapted from Engeström, 1987; p.187)

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This triangular structure suggests that at any given point any two elements are mediated by another element in the system. For example to get to the object, the subject and community are mediated by the artefacts and rules.

Cognitive Frame Theory

A frame is an abstract formal structure that is stored in memory and somehow encodes and represents a sizeable amount of knowledge. This collection of knowledge representation structures or *frames* grows as more complex frames are built on the existing ones.

We focus on the sequential processes which guide mathematical problem solving activity, the critique which is an information processing operator that is capable of detecting certain of frames, information in one's mind must be typically organized into quite large chunks (Davis & Mc Knight, 1979; Minsky, 1975). Minsky (1975) states "when one encounters a new situation one selects from memory a substantial structure called a frame. This is a remembered framework to be adapted to fit reality by changing details as necessary".

Davis (1984; pp.276-7) lists six possible frame selection procedures:

- Bootstrapping – deals with what one sees in the given. It leads to certain associations, frames that involve such things;
- Not knowing too much – deals with the limited knowledge on a topic or concept;
- Focus on some key cue – deals with the presence of a small number of cues that lead to the retrieval of some specific frame;
- Using context – deals with how the context influences student's choice;
- Using systematic search – deals with the student learning things in a systematic way and develops systematic procedures for searching his/her memory;
- Parameter-adjusting or spreading activation – deals with how certain frames or assimilation patterns acquire high expectation values.

Categorisation of Errors

Errors in trigonometry can be categorized as structural errors, executive errors and arbitrary errors as described by Donaldson (1963). Structural errors arise from a failure to appreciate the relationships involved in a problem or group of principles essential to the solution of the problem. Failure to tackle relationships in a problem arises from a false expectation of the problem. Structural errors may arise in connection with variable interaction. These errors occur in the deductive mode when the subject reasons deductively but fallaciously. One may expect that failure to perceive inconsistency or consistency would be a common source of structural error (Donaldson, 1963). An incorrect frame may be retrieved or the frame maybe not developed adequately. Structural errors are caused by incorrect frame retrieval, sketchy or incomplete frames, deep-level procedures and sub-procedures.

The second type of error is the executive error. Executive errors occur when there is a failure to carry out manipulations, although the principles may have been understood. Some defect of concentration, attention or immediate memory lie at their origin. The most prevalent of

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this class of errors is loss of hold on reasoning (Donaldson, 1963). A correct frame maybe retrieved but a sub-frame responsible for calculations maybe underdeveloped.

The third type of error is the arbitrary error. Arbitrary errors are those in which the subject behaves arbitrarily and fails to take account of the constraints laid down in what was given. These are errors which have as their outstanding common feature a lack of loyalty to the given. Sometimes the subject appears to be constrained by knowledge of what is "true" by some considerations drawn from "real-life" experience. Sometimes there is no constraint of any kind. The subject simply decided "it is so" (Donaldson, 1963). Incorrect inputs maybe assigned to the retrieved frame. "Arbitrary" errors are caused by mapping incorrect inputs to the retrieved frame (surface structures).

Methodology

Qualitative and quantitative methods were used.

The Questions and the Scoring Procedure

Scrutiny of the students' protocols suggested was based on the official marking memorandum.

A score of 0 was given for no response or for an incorrect attempt.

The grading procedure for the items also took into consideration the following:

- equivalent answers or methods were accepted;
- correct answers were give full credit;
- understanding of a method was the main criterion used rather than penalizing for carelessness.

Question (a) was based on this item testing reciprocal functions and quotients. Students had to simplify the LHS to prove the identity.

Prove the identity $\dfrac{\cos x \sin x \sec x}{\tan x \cot x \cos ec\ x} = \sin 2x$

Coding scheme: 1 mark for writing $\sec x$ as $\dfrac{1}{\cos x}$ and $\tan x$ as $\dfrac{1}{\cot x}$ and $\cos ec\, x$ as $\dfrac{1}{\sin x}$

Question (b) was also based on the proof of a basic trigonometric identity. It also required quotients and reciprocal functions.

Use a sketch to prove $1 + \tan^2 x = \sec^2 x$

Coding scheme: 1 mark for drawing the correct sketch. 1 mark for simplifying the LHS and 1 mark for showing equivalence.

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Question (c) was also based on proving an identity. It also required quotients and reciprocal functions. This question required simplification of both sides of the equation to prove equivalence.

Prove $\tan x + \cot x = \sec x + \operatorname{cosec} x$

Coding scheme: 1 mark for writing $\tan x = \dfrac{\sin x}{\cos x}$ and $\cot x = \dfrac{\cos x}{\sin x}$, 1 mark for simplifying the LHS and 1 mark for showing equivalence.

Question (d) required application of reduction formula, special angles and co-ratios.

Prove $\dfrac{\sin(90° - x)\sec(x - 360°)\tan(180° + x)}{\operatorname{cosec}(180° - x)\cot(90° - x)\cos 0°} = \sin x$

Coding scheme: 1 mark for correct simplification of each expression on the LHS and 1 mark for showing equivalence.

Question (e) required application of special angles and negative angles.

Prove $\dfrac{\cot 240° + \sin^2(-225°) - \cos^2(30°) + \sec(-330°)}{\sin(-210°)\cos 0° + \sin^2(-60°) - \sin^2 210°} = \sqrt{3} - \dfrac{1}{4}$

Coding scheme: 1 mark for correct simplification of each expression on the LHS and 1 mark for showing equivalence.

Results

Table 1 shows the error classification for each item from the assessments that were concerned with basic trigonometry. Students encountered more structural errors than, executive errors and arbitrary errors.

Table 1: Classification of errors

Classification of Items	Structural Error	Executive Error	Arbitrary Error
Item (a)	55	43	22
Item (b)	73	37	24
Item (c)	57	28	21
Item (d)	86	36	18
Item (e)	68	38	19

Discussion

In question (a) the majority of the students were able to make the correct substitution but still failed to prove the identity. The descriptive analytics indicate that frames from the algebra domain were underdeveloped. 55 structural errors (37 percent) and 43 executive errors (29 percent) and 22 arbitrary errors (15 percent) were recorded. These are indicative of incorrect

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frame retrieval. (Davis 1984) refers to this as the ability to do a systematic search for the correct frame. Here multiple frames were needed to correctly solve the problem and this was lacking. Student's also displayed inadequacies in manipulations of fractions.

In question (b) almost 50% of the cohort were unable to draw a correct sketch to present the proof. This is indicative of "not knowing too much". These concepts are met at grade 10 at secondary school. It shows that conceptual understanding is lacking.

In question (c) there were 38 percent structural errors. Errors were similar to those in question (a). Students were making errors in connection with variable interaction and frames from algebra were inadequately used.

In question (d) the expression $\sec(x-360°)$ seemed "unfamiliar" to the majority of students. A relatively high percentage of structural errors were recorded (51 percent). In question (d) there were 58 percent structural errors. This question recorded the most of the errors

In question (e) the terms $\sin^2(-225°), -\cos^2(30°)\, and\, \sin^2(-60°)$ were confusing to students. Students failed to see that the expression had to be simplified first and then squared.

These would represent descriptive analytics and provides valuable information both for curriculum planners and facilitators for future design of instructional material.

Items from discussion forum forms part of both the diagnostic and prescriptive analytics. It provides real time information on errors and misconceptions that students experience.

Some exemplars from the discussion forum on Blackboard were selected for discussion.

Item 1 is the initial post to a problem:

> "$\cos^2(180-x) = -\cos^2 x$
> *I just want to ask how we reduce* $\sin(720°-x)$*?"*

Item 2 is a response to item 1 given by another student:

> "$\cos^2(180°-x)$ *is not equal to* $-\cos^2 x$
> *You need to work out* $\cos(180-x)$ *and then square it. You should write it like this:*
> $\cos^2(180°-x) = [\cos(180°-x)]^2 = (-\cos x)^2 = +\cos x$
> *I hope this helps."*

Then for the other one reduce $\sin(720°-x)$ to $\sin(360°-x)$ and them solve it.

In the fourth quadrant sine is negative so $\sin(360°-x) = -\sin x$

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Item 1 shows that the student mixes up the signs in the reduction formula. The student is not clear about what $\cos^2(180°-x)$ means. It is clear that the student knows that the cosine function is negative in the second quadrant so giving a negative answer "seems" appropriate.

Item 2 posted by another student gives clarity. It may occur that the first student was not able to write $\cos^2(180°-x)$ correctly in terms of using the correct notation to assist the solution, hence an incorrect sign resulted.

Item 3: is another problem experienced by a majority of students:

> *"Good people I am having a problem with $\tan(x-180°)$. Is the answer $-\tan x$?*
> *tan is negative in the second quadrant so it must be correct."*

Item4: is a response to the problem in Item 3:

> *"You are incorrect. First write $\tan(x-180°)=\tan[-(180°-x)]$ Now you can work it out"*

Again this is a case of mixing the signs in the reduction formula. These examples forms part of parameter-adjusting (Davis 1984) which deals with how certain frames or assimilation patterns acquire high expectation values.

The Descriptive analytics provided by the student post on Blackboard can be used both by the students in the class group and the facilitator. The correct response is the Prescriptive Analytics offers a solution to the problem. Most important of all is that a diagnosis can be made as to why the student struggled to follow the correct algorithm to get the solution.

What is likely to happen (Predictive analytics) is that more students will benefit from the discussions unlike when it is done on a one on one basis or in a class tutorial face to face.

Linking this to the Activity System suggested by the theoretical framework it makes sense to create an environment that encourage student collaboration in a student-centred environment to capture errors and misconceptions early enough to be able to assist and motivate discussion.

Conclusion

Learner analytics from posts on the discussion forum provide teaching assistants and course facilitators with valuable information on student's experience. The errors and misconceptions identified can be dealt with by peer collaboration or input from teaching assistants or the course instructor. In an online environment these can be done effectively and quickly as compared to traditional tutorials that have a scheduled time slot.

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Lots of practice is necessary to undo the incorrect frames that have been cemented in the student's mind as their "correct frames". The online forum using the discussion forum is recommended as a means to assist the reinforcement of the correct frames.

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LEARNING REPRIORITISED: SUPPORTING THE ODEL STUDENT BY DEVELOPING A PERSONAL INFORMATION MANAGEMENT SYSTEMS AND STRATEGIES PROGRAM (PIMSS)

Ignatius G.P. Gous, College of Human Sciences, University of South Africa,
Jennifer Roberts, Institute for Open and Distance Learning (IODL), University of South Africa, South Africa

Abstract

Students do not know how to learn, and lecturers do not know how to teach their students how to learn, is what is being argued in this position paper.

Learning is the process where the brain is changed by inputs which forms new or changed representations, which lead to changes in behaviour in specific contexts.

Learning is the ultimate goal of teaching. If learning doesn't happen, then education, whether open, at a distance or face-to-face, has failed. This is even more of a problem for Distance Education learners and educators, because this lack of, or compromised ability is less visible than at contact institutions.

What is therefore needed, is scientifically based support programs teaching learners of all ages how to become self-directed life-long learners, skilled to assess, manage and weigh masses of available information and the ability to keep up with a super-fast changing reality. This is a program aimed at providing student support, by developing the person in terms of personal development (identity), lifelong learning skills (mastery), and making a meaningful contribution (legacy). It is similarly also aimed at continuing personal development of lecturers and staff, for their own lifelong learning as well as empowering them to support their students' learning.

Addressing these issues, a Personal Information Management Systems and Strategies Program (PIMSS) was developed. It is based on recent and valid Mind, Brain, and Education Science principles, and is made available on mobile devices for the sake of conciseness and optimal availability. The theoretical basis of the PIMMS Program is indicated as Neuro-constructivism, and the rationale and content of the program is briefly explained.

Learning needs to be prioritised, if teaching is to be effective.

Learning – A Needed Priority

What is the oldest profession on earth?

Surprisingly, and contrary to what you might be thinking, it is teaching and learning... From time immemorial humans had to teach their young and their peers how to master life and living. Fast forward to the 21st century, and in essence not much has changed. Teaching and learning is still foundational to human life. It is more formalised, professionalised, specialised, and complex than back in earlier times, but now as then, the more experienced (or experts) still have to guide the less experienced (or novices) towards deeper knowledge and insights.

Learning is the ultimate goal of teaching – if learning doesn't happen, education, whether open, at a distance of face-to-face, has failed. Then all the institutions, research and theories have missed their reason to be and their primary goal.

In this position paper, I argue the case that learning is not afforded its rightful place of importance by all stakeholders, from industry, management, lecturers as well as learners themselves. Reasons for this are touched upon, ranging from challenges making it difficult, to ignorance about it.

This is of heightened importance for DE institutions, because compromised, ineffective learning is more difficult to detect and addressed when happening at a transactional distance between lecturer and student.

A solution for this situation is suggested, in the form of a scientifically based program intended to increase the learning proficiency of students as well as the pedagogical proficiency of lecturing staff, adding to their continued professional development.

Each of the aspects regarding the role players as well as the suggested solution warrants an extensive study on its own, with in depth supportive arguments. However, in this position paper issues will be merely touched upon in an "ears of the hippopotamus" way as it is being called in Africa – what emerges on top rests upon a solid and voluminous body of evidence underneath. Much more can and will be said when this presentation is being published.

Learning – A Neglected Priority

What we are, and should be wondering about, is learning. All the hallowed face-to-face halls of the Oxfords, Cambridges, Harvards, MIT's, Max Planck's and Oldenburgs, and all the erstwhile post-office and mail-based OU's, UNISA's, IGNOU's and other megaliths, are in existence not for their own sake, but primarily for learning to take place. Period. Learning is king and queen. Learning is the holy grail. If not, woe to us and shame on them. If we agree to it that learning is the holy grail, the be-all and end-all of what we are busy with – and it is – then we need to know what is effective learning, and how can we create circumstances conducive to learning. How do we know that learning has taken place?

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To wonder scientifically, we need some guiding rigor. We can therefore wonder about learning in Bronfenbrenerian-like categories of Macro, Meso and Micro. Reality, however, is always more complex and encompassing than the categories we need to reduce it for the sake of manageability. It is therefore no surprise that learning straddles the levels, appearing in all three of them. In fact, it is almost reassuring that it happens, because it underscores the centrality of learning to what we are focusing upon, and it humbles our attempts to reduce reality to limiting categories, which to be honest, we cannot do without.

There are some indications that all is not well with learning. One glaring indicator is the low throughput rate at universities, especially at distance education institutions. This presentation is therefore scouting the terrain of learning, with the eventual goal of describing an intervention aimed at supporting students and staff to become self-directed life-long learners, successful in completing their formal studies and equipped for learning there-after. Attention is given to various role-players involved in teaching and learning, attending to the wants of the community at large, of management, of lecturers and ultimately of learners and students. This is followed by a description of what effective learning entails, as informed by Mind, Brain, and Education Science based on the theory of Neuro-Constructivism, and how that translated into a practical program aimed at teaching effective learning strategies. This program has been piloted with medical, dentistry and veterinary science students, and is now being rolled out to 160 UNISA students in a course for police officers.

Learning is of and should be of importance to various role players in education in general and distance education in particular. These role players range from the learners themselves, the lecturers teaching them, the management guiding the process, and industry as the final destiny of learners. It is therefore important to ascertain what each of the role players wants, what they get and what challenges they face. The next sections are brief ventures into these questions.

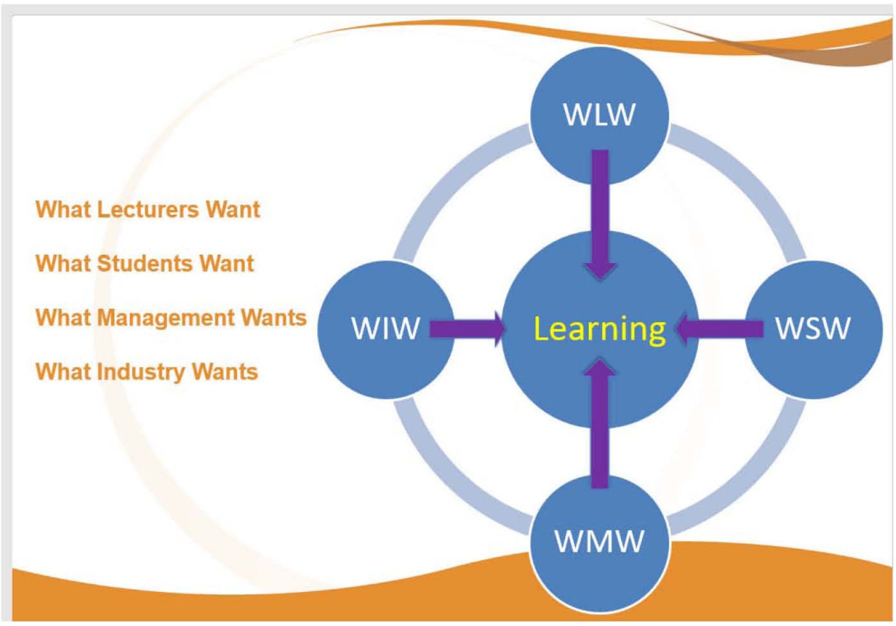

Figure 1.

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What Industry Wants: Lifelong Learners

Students learn in order to be employable in real life jobs. Industry needs skilled employees, who are equally able to re-skill and up-skill themselves when changes require it. All employers and employees need effective learning skills. Current workforce needs up-skilling and re-skilling because of development and change. New entrants to the workforce often come from a background where education at school and post-school institutions is below standard or not specific enough for the task expected of them. Workers re-entering the workforce after time spent raising a family or having been in own employment, need learning opportunities and the skills to come back on par.

Learning as a prerequisite for sustainable development of humanity is underscored in goal 4 of the 2030 Development goals: "Ensure inclusive and quality education for all and promote lifelong learning". According to sub-goal 4.4 "By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship". The reason being an explicit goal, is because it is not happening and 103 million youth worldwide lack basic literacy skills, and more than 60 per cent of them are women (http://www.un.org/sustainabledevelopment/education/). There are also unacceptable high drop-out rates from school (http://www.data.unicef.org/education/primary.html).

Another reality is that research has shown that teaching often focuses on content, but not the ability to master content. Learners are often coached to pass at school level, but not taught to learn. When they are then confronted with the need for independent study after school, coupled with masses of content to be learnt, they are not adequately equipped to master the work and complete their qualifications. Those who make it through further and tertiary education and who enter the job market, often need further training to be able to perform their duties.

Challenges industry experience are that knowledge has a sell-by date, and that the ability to learn is becoming as important as core knowledge. Arie De Geus, head of planning for Royal Dutch/Shell once said, "The ability to learn faster than your competitors, may be the only sustainable competitive advantage in the future." (De Geus, 1988).

> *"When Frederick Taylor published his pioneering principles of scientific management in 1912, the repetitive and mundane nature of most jobs required employees to think as little as possible. Breaking down each task into basic components and standardizing workers' behaviours to eliminate choice and flexibility could help managers turn employees into productive machines, albeit with alienated spirits. Fast forward to the present and we see that most jobs today demand the exact opposite from employees: the capacity to keep learning and developing new skills and expertise, even if they are not obviously linked to one's current job. As academic reviews have pointed out, people's employability – their ability to gain and maintain a desired job – no longer*

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> *depends on what they already know, but on what they are likely to learn." (Chamorro-Premuzic & Swan, 2016)*

They add "In other words, higher career security is a function of employability, and that in turn depends on learnability. Thus Eric Schmidt notes that a major pillar in Google's recruitment strategy is to hire "learning animals," while EY recruiters observe that "to be a standout, candidates need to demonstrate technical knowledge in their discipline, but also a passion for asking the kind of insightful questions that have the power to unlock deeper insights and innovation for our clients. Sadly, most organizations have yet to wake up to this reality, so they continue to pay too much attention to academic qualifications and hard skills, as if what entry-level employees had learned during university actually equipped them for today's job market. Although learnability does boost academic performance, just because someone is job-ready when they obtain their educational credentials does not mean that they are also learning-ready." (Chamorro-Premuzic & Swan, 2016).

In similar vein, Bersin (2016) adds "Since we now expect learning to be as simple and compelling as watching YouTube, hundreds of video-based content providers and MOOCs offer free bite-sized content for us to consume on our phones while sitting in the coffee shop or standing in the subway. But corporate learning management systems remain slow, hard to use, and difficult to maintain. They're getting in the way of employee development instead of supporting it. At the same time, the demand for learning is greater than ever: Bersin by Deloitte's latest research with Glassdoor shows that learning and career opportunities are the biggest drivers of employees' willingness to recommend their company as a great place to work for people under age 40.".

What industry wants is people with the ability to learn.

What Management Wants: Timeous Completion

The prestige but especially funding of institutions of higher learning is linked to students who graduate successfully and in an acceptable timeframe.

Challenges to management and their institutions are the high drop-out rate, especially of distance education institutions (Kritzinger & Loock, 2012). According so Simpson (2013) "there is a 'distance education deficit' with many distance institutions having less than one-quarter of the graduation rates of conventional institutions. … one reason for the deficit is the 'category error' of confusing teaching with learning, and that institutions have focused too much on the provision of teaching materials, especially online, and too little on motivating students to learn."

Linked to this is a mixed, almost confusing, bag of results. Effective learning does take place – sometimes in spite of inadequate teaching, sometimes as the result of good teaching, and often as the result of brute brain power. Confusingly, ineffective learning also occurs – sometimes in

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spite of good teaching, sometimes as the result of inadequate teaching, and sometimes in spite of good potential.

What management wants is predictability of students who learn effectively, thereby passing and graduating. On several university websites see bibliography) there are *study methods tips*, and with that it is seen that they did their duty in terms of student support.

Learning, however, is much more than *study methods*. Learning is a disposition towards life and living, a set of character traits and resulting habits which creates a self-directed, lifelong learner. As such, learning support should be a priority as part of student support, as well as part of continuous professional development of staff – for their own learning as well as to be able to support their students by including learning as part and parcel of their teaching.

What Lecturers Want: Mastery of Subject Knowledge

Lecturers want proven mastery of subject knowledge. They themselves are appointed on the strength of their subject knowledge, and want their students to become similarly informed and knowledgeable.

There are, however, serious challenges to effective subject mastery, namely a knowledge explosion and democratisation of knowledge

We are faced with an information overload as never before. Every two days we create about five exabytes of data. That is as much information as humans discovered from the dawn of civilization up until 2003, according to Eric Schmidt, CEO of Alphabet-Google (Siegler, 2010). In the light of this and while talking about executive function in education, Diamond and Lee (2011; p.959) wrote

> *"Children [as well as students and adults - IG] will need to think creatively to devise solutions never considered before. They will need working memory to mentally work with masses of data and see new connections among elements, flexibility to appreciate different perspectives and take advantage of serendipity, and self-control to resist temptations and avoid doing something they would regret."*

Add to this the fact that lecturing staff is appointed for subject knowledge, and not pedagogical prowess.

> *"…there is an impressive body of evidence on how teaching methods and curriculum design affect deep, autonomous, and reflective learning. Yet most faculty are largely ignorant of this scholarship, and instructional practices and curriculum planning are dominated by tradition rather than research evidence. As a result, teaching remains largely didactic, assessment of student work is often trivial, and curricula are more likely to emphasize content*

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> *coverage than acquisition of lifelong and life-wide learning skills." (Knapper, 2010; p.229).*

Lecturers might be experts in their fields and are usually aware of their students' lack of academic skills, but they often do not know how to remedy the situation. According to Berrett,

> *"A growing body of evidence from the classroom, coupled with emerging research in cognitive psychology and neuroscience, is lending insight into how people learn, but teaching on most college campuses has not changed much, several speakers said here at Harvard University at a daylong conference dedicated to teaching and learning.*
>
> *Too often, faculty members teach according to habits and hunches, said Carl E. Wieman, a Nobel Prize-winning physicist and associate director of the White House Office of Science and Technology Policy, who has extensively studied how to improve science education. In large part, the problem is that graduate students pursuing their doctorates get little or no training in how students learn. When these graduate students become faculty members, he said, they might think about the content they want students to learn, but not the cognitive capabilities they want them to develop." (Berrett, 2012)*

Lecturers want students who learn effectively, but they need to develop the know-how to teach their students not only subject knowledge, but also the ability to master knowledge long after they move away from the presence of the lecturer.

What Students Want: Successful Learning

How do students actually learn? Many students underperform or even fail, not because they lack the ability, but because they lack the skills necessary for successful study. It is therefore an educational and pedagogical responsible imperative to not only teach course content expertly, but to include in the teaching critical skills necessary to master the content.

The above statements are the results of cognitive and metacognitive research at international academic institutions. They stress the need for the teaching of metacognitive strategies to students mainly because many students in South Africa are ill prepared for autonomous study as the result of a compromised school system. In short, students do not have adequate self-knowledge, and they do not know how to listen, the do not know how to read properly, they do not know how to study effectively, and they do not know how to perform in assessment.

In a document published by the Commonwealth of Learning titled "Creating learning materials for open and distance learning: A Handbook for Authors and Instructional Designers" (Freeman, 2005) the authors discuss instructional design, learning theories and how adults learn, but then add the following: "Whilst the above principles are widely quoted and followed in designing post-school courses, it has to be admitted that our knowledge of how people learn is very patchy. Much of the research on adult learning has been conducted on very small groups, often of middle-class learners in the developed world. The limitations of our knowledge are discussed further by Brookfield (1995)."

Most of us have heard and agree with the age-old and well-known proverb of Chinese origin: "Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime." Having heard that, do we listen to this advice when teaching? Often in teaching and learning the focus seems to be on mastering course content. Knowledge expands at such a pace, however, that qualifications have a limited life span before they become outdated. Hence the need for students to become life-long learners, in order to initially master prescribed content, but then also to keep up to date by learning and re-learning. Successful life-long learners display certain characteristics, with certain meta-skills part and parcel thereof. Meta-cognition is the ability to plan, monitor and evaluate self, tasks and strategies in pursuit of meaningful goals (Flavell, 1976). Strategies crucial for successfully completing learning tasks are listening, reading, writing and study skills. The reality is that these skills are seldom taught or being taught continuously. Students are expected to study the subject matter and course content, but how they are supposed to do it, is not attended to systematically or even not at all. It is for this reason that students often arrive at college or university as rote learners, as well as poor readers and listeners. In similar vein, good writing seems to be an endangered skill.

What is needed, is support programmes for students. Anderson and Dron (2011; p.80) state "It is clear that whether the learner is at the centre or part of a learning community or learning network, learning effectiveness can be greatly enhanced by applying, at a detailed level, an understanding of how people can learn more effectively: Cognitive, behaviourist, constructivist and connectivist theories each play an important role."

A challenge to effective learning, is the availability of many popular programs claiming to teach effective learning strategies, but which are in actual fact promoting neuromyths. Neuromyths are ideas that are popularly believed, but that are lacking any scientific support, and that do not really make a difference for the better, such as left-brain right-brain distinction, VAK learning styles and Mozart music. Students and staff need to be able to discern what is good science and what is pseudo- or pop-science, and put that into practice (Dekker et al., 2012; Tokuhama-Espinosa, 2015).

What is interesting, but extremely difficult to explain conclusively, is a downward trend in the search for terms on the Internet regarding *Learning* and *Learning how to learn*.

A Google Analytics search for the term *Learning* with the focus of interest over time, pints to a downward interest. Numbers represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. Likewise, a score of 0 means the term was less than 1% as popular as the peak.

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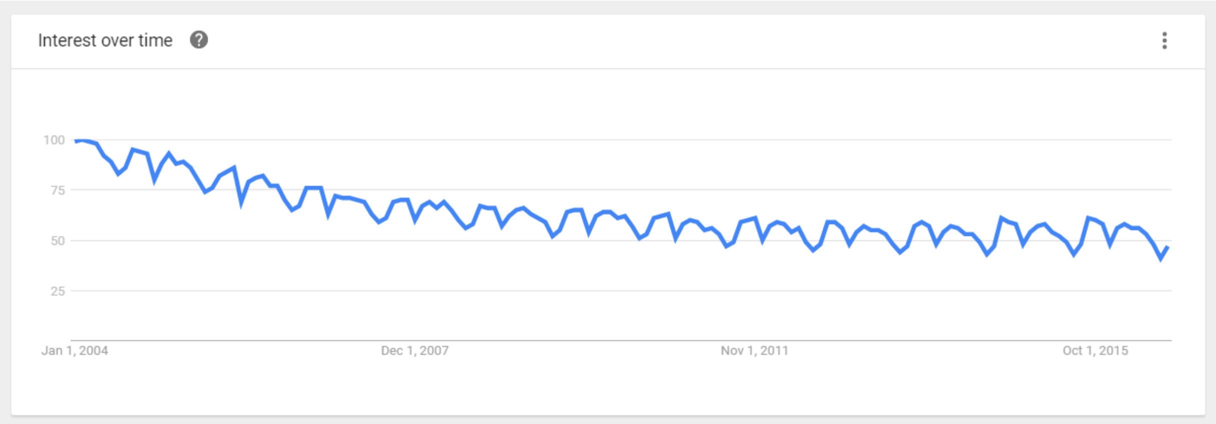
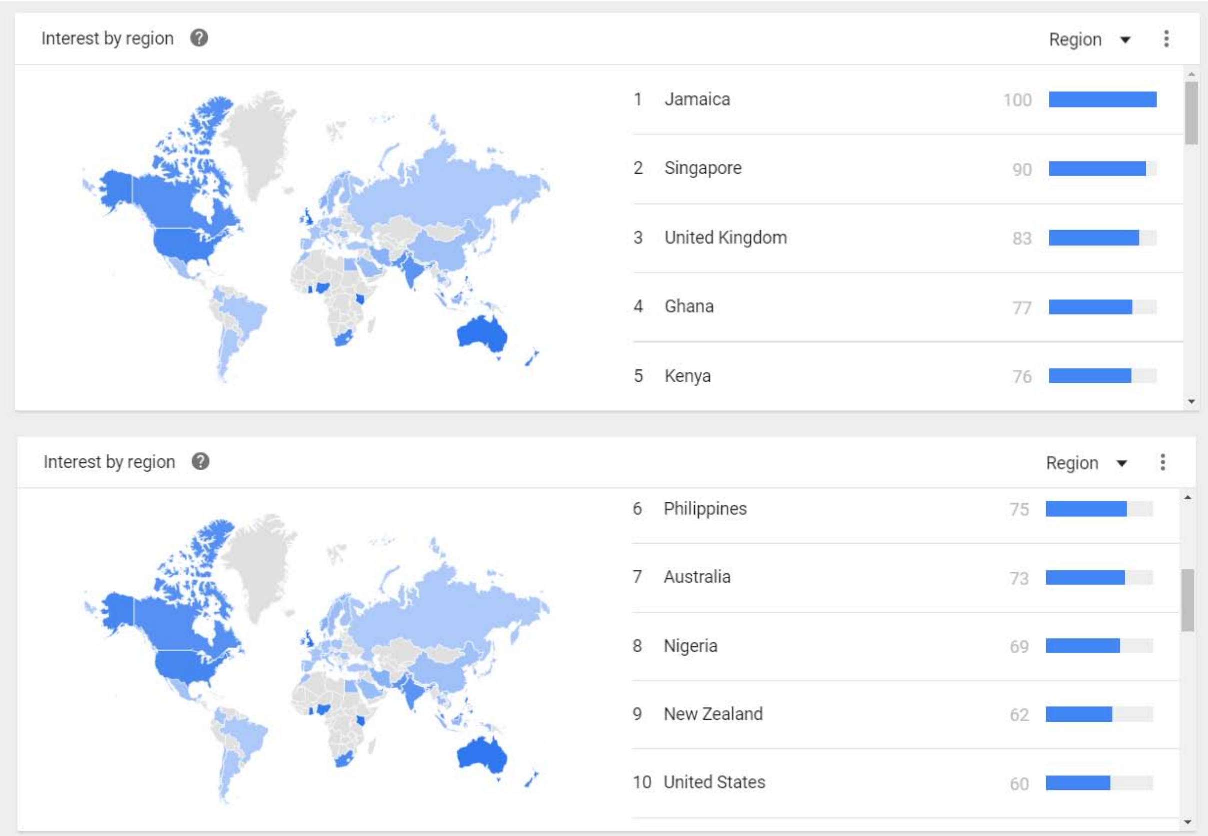


Figure 2.

A similar search regarding interest in the term *Learning* by region, returned the following results. Values are calculated on a scale from 0 to 100, where 100 is the location with the most popularity as a fraction of total searches in that location, a value of 50 indicates a location which is half as popular, and a value of 0 indicates a location where the term was less than 1% as popular as the peak.

Note: A higher value means a higher proportion of all queries, not a higher absolute query count. So a tiny country where 80% of the queries are for *bananas* will get twice the score of a giant country where only 40% of the queries are for *bananas*.



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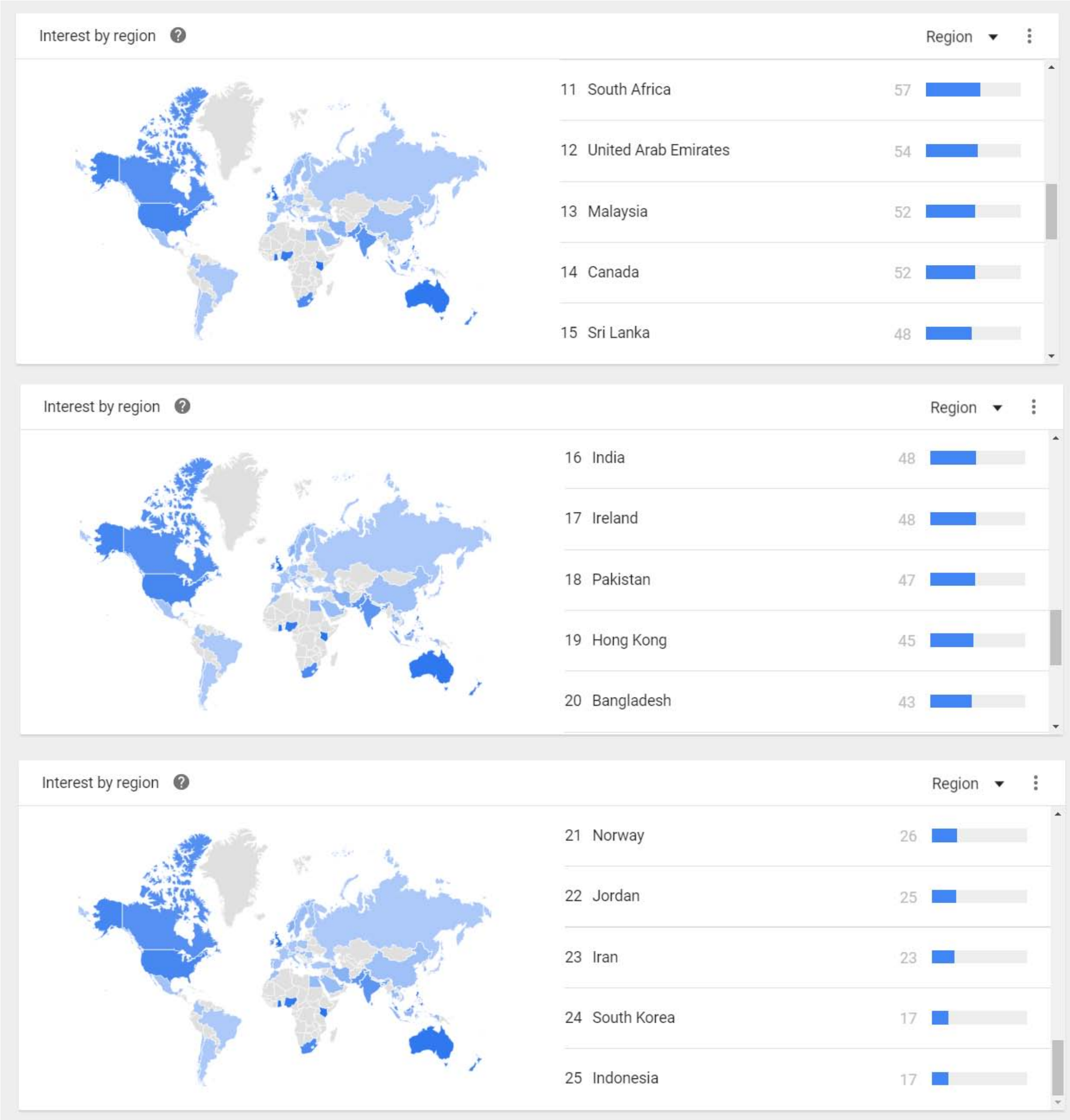

Figure 3.

A similar search on the worldwide search for the term *Learning how to learn* points to a similar downward trend. (Numbers represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. Likewise, a score of 0 means the term was less than 1% as popular as the peak.)

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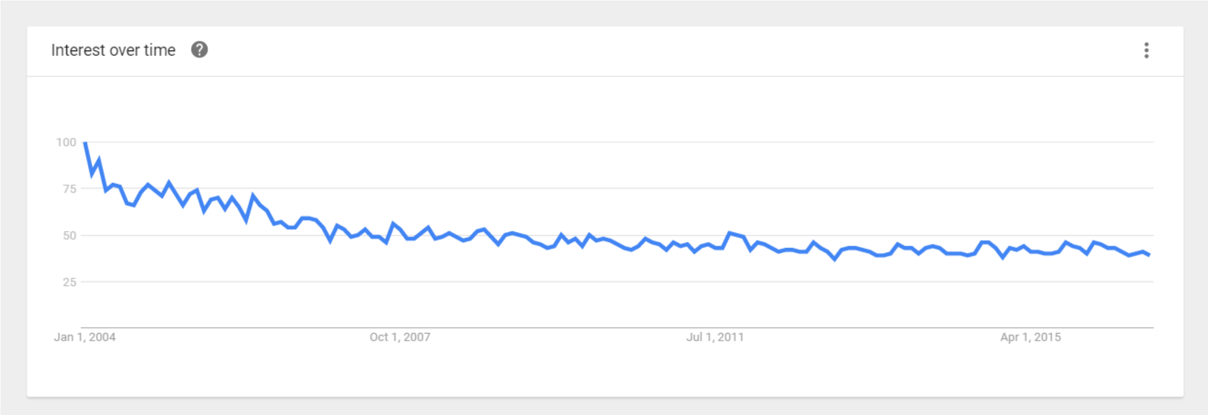
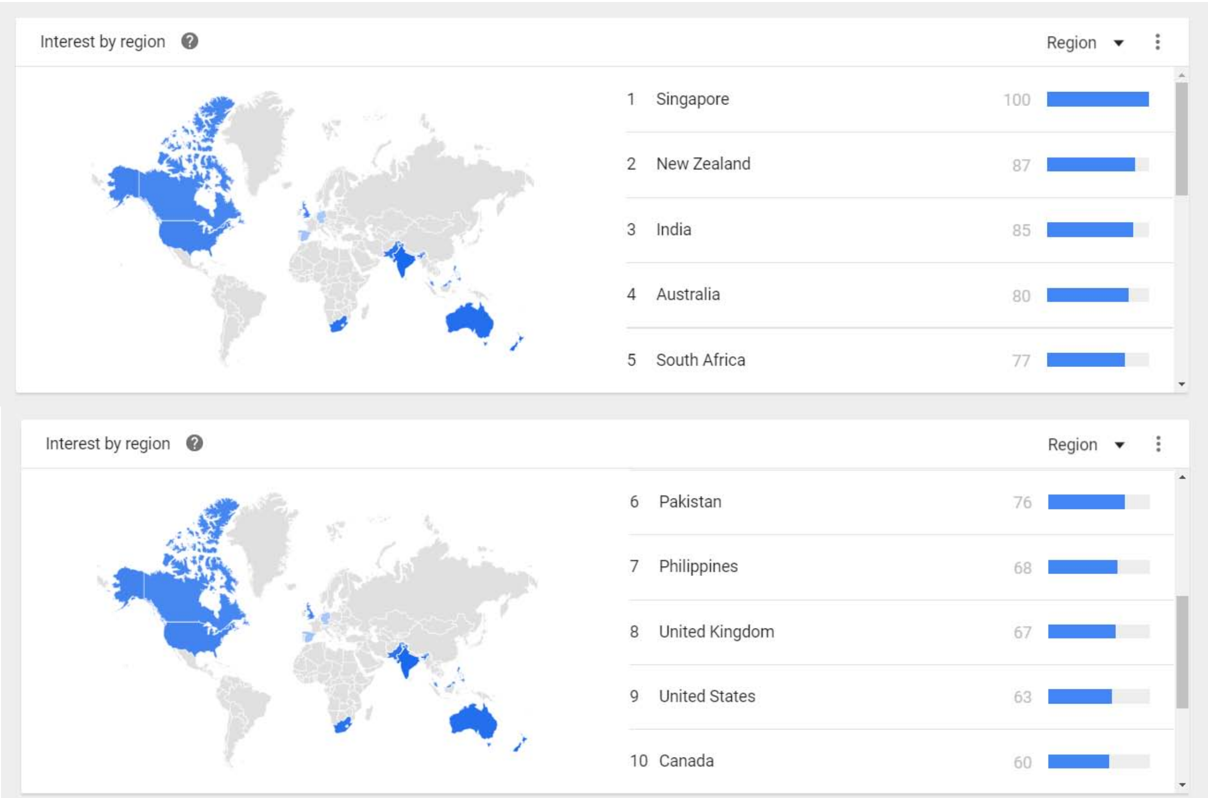


Figure 4.

In terms of region, the following results were obtained. (Values are calculated on a scale from 0 to 100, where 100 is the location with the most popularity as a fraction of total searches in that location, a value of 50 indicates a location which is half as popular, and a value of 0 indicates a location where the term was less than 1% as popular as the peak.)



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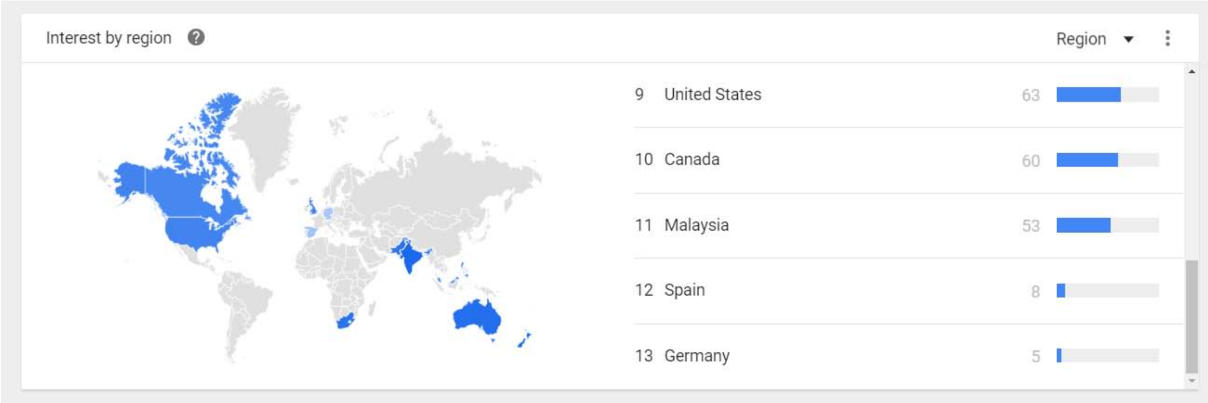

Figure 5.

There is not enough search data available to show search statistics for some countries who are seen to be doing well academically, such as Finland and Hong Kong. A possible reason might be that these countries have a culture and/or systems in place that provides for *learning to learn* skills. The fact is, not enough people search for *learning to learn* to be considered statistically relevant.

Web users (which may include students) therefore either feel they know well enough about how to learn, or they do not realise the importance of learning how to learn.

Bottom line is, learning how to learn does not come naturally – it is an art and skill that needs to be taught in order to be learnt. Therefore, dedicated programs about this should not only be available, but also needs to be actively endorsed, promoted and taught, preferably part-and-parcel of course content.

Summary: Everybody Wants Effective Learning, for Different Reasons

Effective learning is not merely a case of having a good old study method course going. It is about a comprehensive program aiming at the personal development of staff and student, attending to three aspects, namely Identity, Mastery and Legacy.

- Identity focuses on the person, whether staff or learner – his or her passions, characteristics, inclinations and abilities. Self-image and self-knowledge is brought into play with meaningful life goals, grit and perseverance as well as mindset and resilience.
- Mastery is about effective learning skills and strategies. Aspects such as listening and reading skills are addressed, as well as how to memorise large volumes of work in limited time frames. Effective learning strategies are being taught and trained, while ineffective strategies are being identified and discussed. Attention is also given to neuro-myths, which are widely-held beliefs about learning, many of which do more harm than good.
- Legacy is how people show what they know. This may be in formative and summative assessments such as tests or exams, but also and especially in daily performance and repeated innovation.

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Effective Learning Explained

Mind, Brain, and Education Science is a relatively young interdisciplinary science which developed from combining insights from older, established disciplines such as Neuroscience, Cognitive Science and Education Science. The discipline focuses on how credible research on the mind and the brain can inform and impact on teaching and learning, but also the inverse, namely how teaching and learning research and practice can inform neuroscience and cognitive science.

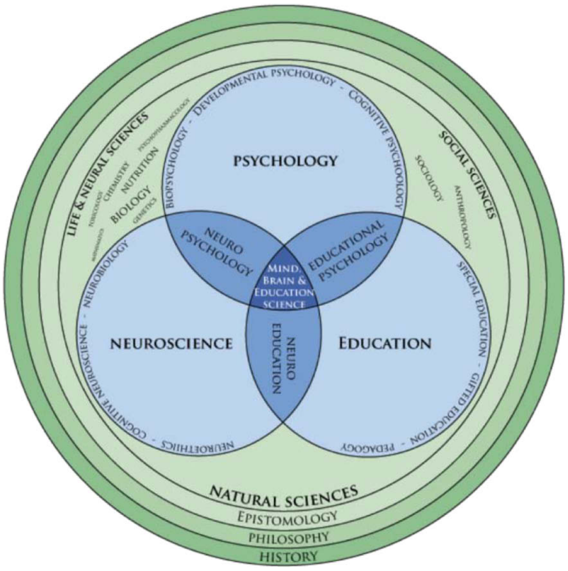

Figure 6. Source: Tokuhama-Espinosa, 2015

The theoretical basis of MBES is neuro-constructivism, which views development as the progressive elaboration of increasingly complex structures, starting with genes, which grows a brain. The brain creates representations, which fosters behaviours in specific contexts. (Karmiloff-Smith, 2009; 2015).

A basic starting point is research on how brains interact with where they function – in their bodies, families, communities and the world. Questions are being asked about how this happens. Are brains at birth empty vessels which are filled with experiences and information as they grow and mature? Are they made up of special “organs of understanding”, almost like the task-specific blades of a Swiss army knife? Are they initially open, ready and waiting for specific inputs, and when that happens, become specialized to attend to and work with that as we grow older, while those areas that are not stimulated, slowly become inactive? The latter seems to be the case, and is the point of departure for MBE Science. In scientific terms, this is the domain-general, domain-specific, and domain-relevant approaches, and the thinking about it is described in a theory called neuro-constructivism.

Mind, Brain, and Education Science evaluated learning strategies, and identified which were effective and which not (Dunlosky, Rawson, & Marsh, 2013; Doyle & Zakrajsek, 2013; Brown, Roediger III, & McDaniel, 2014).

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Effective learning strategies are the following:

- Practice testing;
- Varied Repetition;
- Application Oriented;
- Integration (self-explanation);
- Mnemonic strategies (e.g. Memory Palace);
- Sharing and Teaching;
- Mindfulness;
- Focus without multitasking;
- Interleaved, Spaced.

Learning strategies with moderate utility are the following:

- Write concepts out;
- Old papers and memoranda;
- Mnemonics.

Ineffective learning strategies are the following:

- Read and re-read;
- Highlighting and Underlining;
- Summaries;
- Cramming.

Reputable science gives clear indications how students should learn. It seems this is still a best kept secret, not reaching students and staff.

The PIMMS Program Explained

In order to translate the theories and research into practical guidelines for effective learning, a project was registered at UNISA. It is called the "Mind-Wise Edu-Engagement – Metacognitive Teaching and Learning strategies in ODeL", and the objectives are as follows:

- Objective 1 (Year 1): Establish a baseline of how students at Unisa actually study.
- Objective 2 (Year 2): Develop support programmes for students based on the newest cognitive and metacognitive research. Adapt and refine the provisional MindWise Edu-Engagement program and pilot it in chosen courses and at regional offices.
- Objective 3 (Year 3): Develop training programmes for Unisa lecturers on how they can incorporate cutting edge study skills strategies as an integral part of their course delivery. Develop training programmes for lecturing and support staff, based on the findings on how Unisa ODL students actually learn, as well as on the experience gained during the piloting of the MindWise Edu-Engagement Program, and present them in seminars. Based on the experience of this, develop a online program, short course, or MOOC for Unisa staff but also for ODeL practitioners further afield.

This lead to the development of the PIMM Program, with the following characteristics:

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PIMM Map: It is Personalised (P)

There is not a one-size-fits-all recipe available for how to study. It is true that there are universal learning goals that need to be pursued, such as mastery of language and numeracy, social skills and societal norms, our shared histories and experiences, and many more. However, the way in which these learning goals are being mastered and managed to suit our own unique life goals, is very personal and is different for each individual. Humankind may share many aspects of their lives but we are unique in the way we live and learn, and especially our reasons for doing so.

PIMM Map: It is about Information (I)

If you know where and especially how, you can access any information you want or need to. The challenge is that this data and information needs to be synthesised and changed into useable and valuable knowledge.

PIMM Map: It is about the Management (M) of information

This over-supply of information could lead to people feeling overwhelmed and giving up on trying to master it. Only those who have the ability to carefully sift through, choose and channel information that is relevant to them will be able to manage to become proficient in acquiring the relevant information that they need.

PIMM Map: It is about the Mastery (M) of information

If you are building a wall, but each time have to walk some distance to fetch each and every brick, you are going to build for a very long time. If, however, the bricks are readily available within reach on site, your construction will progress speedily. Even though information today might be just a click away, we still have to know many facts and skills by heart in order to be successful.

The PIMM Propel-Learn schema sets the scene for life-long learning actions, by guiding activities and directing decisions. It creates the space which learners can fill with specific activities and strategies, many which have been known to humankind for several centuries. Learners need to choose their strategies wisely, based on the latest evidence and research which has been carried out, as well as their own personal strategies that they know appeal to and work for them.

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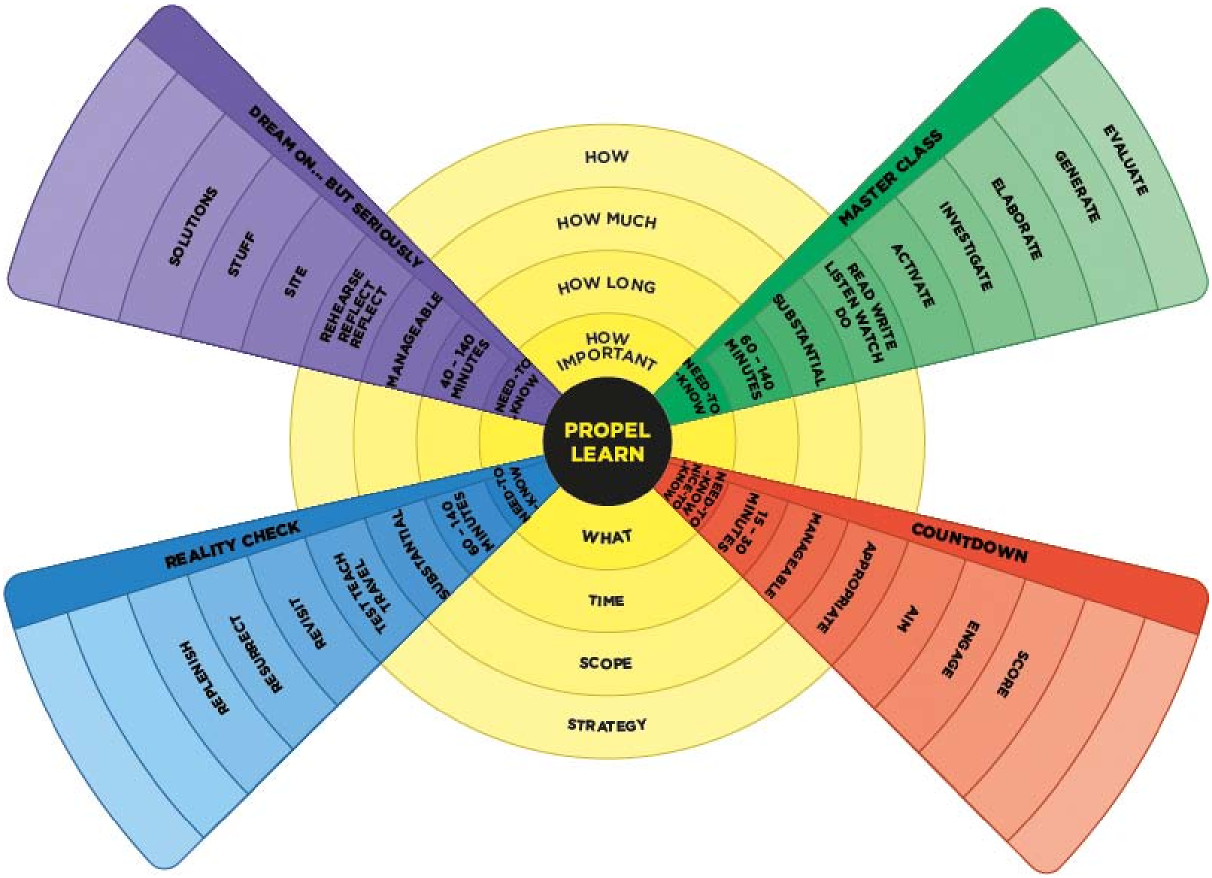

Figure 7.

Pilot and Roll-out

In a pilot project the program was presented in face-to-face seminars with medical, dentistry and veterinary students. It was established that they use the following learning strategies:

- Read and re-read;
- Highlighting and Underlining;
- Write concepts out;
- Summaries;
- Old papers and memoranda;
- Mnemonics.

Exposure to the program resulted in positive experiences by the students, which was reported elsewhere.

Currently it is being rolled out to students at the University of South Africa, and results will become available towards the end of 2016.

In order to make it easily available, the program is accessed via QR code on mobile devices.

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Figure 8.

Propel-Learn Lesson Layout

The layout of the sixteen-day course on the PIMM Propel-Learn Tool is as follows:

Session 1. Introduction (which you completed yesterday)

Session 2. Overview of the course.

You need a map to know where to go and to understand how each aspect fits into the bigger picture. This session is the Big Picture.

Session 3. Decision time - the four How's (How important, How much time, How much work, and How to study)

Decision Time is about four crucial questions, namely How important is the information what you are spending time on, How much time you have available, How much work you want to complete in the time available, and How you are going to manage and master the content. Your answers to these questions will steer you to choose one of four directions, namely Master Class, Countdown, Reality Check, and "Dream on,... but Seriously!". But first, it is Selfie time (to see what is important to you)!

Session 4: Decision Time (Continued)

In this session, we attend to the three remaining How-questions, as well as the directions it will steer you (the propel-blades of Propel-Learn). Prepare so long to go places - but also look out for Goldilocks!

Session 5: The Doppler Study Schedule

We all know the stress because of cramming, but not all people experience the joy because of planning. In this session, we use a creative way to plan your study schedule in a way that really works.

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Session 6: Master Class (1) - how to spend your learning time well

Master Class takes place when you have an hour or more available for studying. During such a session you will focus on a comprehensive set of strategies, aimed at understanding, memorising and applying. The aspects of Master Class will help you remember what you learn, and takes you through the aspects of memory, namely Encoding, Consolidation, Storage, and Retrieval.

Session 7: Master Class (Continued) - Activate, Investigate, Elaborate, Generate and Evaluate

Master Class has five important movements, namely Activate (where does it fit?), Investigate (encode what it is all about), Elaborate (store for easy retrieval), Generate (how do I use the information in my life), and Evaluate (how do I rate my learning). Master Class gives a structured plan to make learning effective and therefore enjoyable because it will work well.

Session 8: Study Strategy 1: Travel (The Method of Loci, or Memory Palace)

Travel is an age-old strategy for remembering masses of information effectively in a relatively short period of time (also called the Method of Loci - Google or Ask Siri about this for more information). It really works well with some kinds of material, and here we show you how to use it while learning how our memory actually works.

Session 9: Study Strategy 2: Teach and Tell

Teach and Tell is a very effective way to measure what you really know and what you just think you know. If you can fluently tell someone what you have studied and are able to say and use the correct terminology, then you really know the work well. Please try this at home!

Session 10: WWW/W (What Went Well / Wrong)

In learning, we have to understand where things went wrong if we did badly in tests or exams. In this way, we can take remedial steps to prevent it from happening again. We also have to understand why things went well if it did so that we can repeat those habits, strategies, and activities. To evaluate our learning successes and failures, we have to understand what learning entails. Learning takes place in four phases, namely Encoding, Consolidation, Storage, and Retrieval.

Session 11: Countdown - Turning wasted bits of time into productive learning sessions

Sometimes we have only about 15 or more minutes available. Too short to study, you might think? Not at all. Many a worthwhile activity can be done in a short period of time if we are motivated, prepared and focused. Here we show how to get down to business in no time flat - and reap the rewards. To do that, you need to discern between G2K and N2K - Good-to-Know learning and Need-to-Know Learning. Then you need to Aim, Engage, Score - that is how you do it!

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Session 12: Reality check (1) - Revisit, Resurrect, Replenish

It is really a bad experience when you think you know what you have studied, and then in a test, exam or evaluation you find out you cannot remember enough of it. What is an even worse experience, is to write an exam and you expect it to go well, and you get the result and the marks you obtain show you were totally wrong about it. Therefore, an important question is: How do we ensure beforehand that we are well prepared? This is what Reality Check is all about - but first, we need to look at the Forget Curve, which shows how quickly we actually forget what we have learnt if we do not rehearse.

Session 13: Reality check (2) - Test, Teach, and Travel

Reality check is to show what you know. Information, knowledge, and skills are there to be used. What has been stored, must be retrieved. Here we focus on how to do it effectively.

Rehearsing after initial learning during the Master Class or Countdown sessions is performed in three steps of the Reality Check session, namely Revisit (to go through previously learnt work repeatedly), Resurrect (show what you know), and Replenish (add what you forgot or got wrong).

Session 14: Dream on ... but seriously!: Reflect (1) - Site, Stuff, and Solutions

Our brains need to build new links, pathways, and networks for storing and managing knowledge and skills. This takes time, and the time it happens is when we dream - dream while we are awake and dream while we sleep. "Dream on ... but seriously!" is about how to take charge of our dreams and turn them into positive and productive events where we make sense of what we have learnt. Sometimes we reflect, which is when we just think almost casually about what we have learnt. Sometimes we have to rehearse in the sense that we think about what we have learnt in a structured way. Sometimes we have to re-imagine things, in other words, apply what we have learnt to solve problems in a novel and creative way. In this session, you will start to plan for positive and constructive daydreaming-sessions.

Session 15: Dream on ... but seriously! (2): DREAM

Data becomes information when you know how to use it. Nobody gets it right the first time round. We have to try things out and practice many times – that is why there is a saying “Practice makes perfect”.

Here we help you to practice by DREAMing. The DR stands for Dispute and Room, referring to the problem you need to solve. The E stands for Evidence, referring to relevant knowledge and facts. The A stands for Application, namely possible ways to apply the knowledge to the problem. The dream ends with an M, referring to Measurement, where you gauge how appropriate your performance was.

Dreaming is where you practice beforehand for the real thing.

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Session 16: Earn your wings and keep on learning.

Learning is not our second nature, it is our first nature. We always learn, regardless whether we want to or not. However, we do not always learn optimally or in the most effective ways. Therefore, we also need to learn how to learn, and keep on honing and refining our learning skills. Here we talk about how to keep on "sharpening the sword" throughout life and living.

Way forward

What is needed to prioritise learning at ODeL institutions are scientifically sound programs that works in practice, available to students, known, supported and implemented by faculty staff, prioritised by management and trusted by industry.

Conclusions

Loose standing "study method" programs are not effective. Transfer to specific course content does not happen, and it is seen as something extra and therefore optional.

True learning only happens when it is seen as foundational to personal and professional development. Industry, management, staff and students should be educated to prioritise learning.

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PERSONAL LEARNING ENVIRONMENTS: MOVING BEYOND EPORTFOLIO SCRAPBOOKS

Norman D. Vaughan, Tanya Stogre, Rachel Cool, Kristen MacIsaac,
Mount Royal University, Canada

Introduction

The purpose of this research study was to investigate how teacher candidates (TCs) in a Canadian Bachelor of Education (B.Ed.) program were creating a personal learning environment (PLE) to document their achievement of the knowledge, skills, and attributes (KSA's) related to the Alberta Education Interim Teaching Certification by digitally connecting their personal, classroom, and field-based learning experiences (Figure 1).

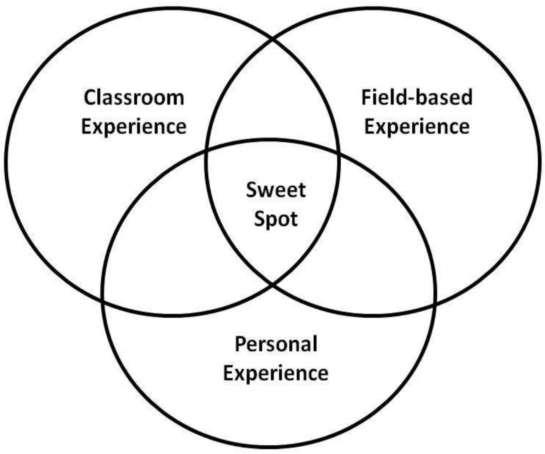

Figure 1. Digital integration of personal, classroom, and field-based learning experiences

All teacher candidates (TCs) in this program design, develop, and maintain a personal learning environment (PLE) throughout the four years of the program. The purpose of this PLE is for students to document and articulate professional growth and development related to the B.Ed. program competencies: planning, facilitation, assessment, environment, and professional roles and responsibilities. This is the space for TCs to develop and communicate self-understanding and create learning goals and strategies that will allow them to be most successful in their future teaching practice (Johnsen, 2012).

The questions that guided this research study were:

- How are these PLEs helping teacher candidates digitally connect their personal, classroom, and field-based learning experiences?
- What challenges are the TCs encountering with the PLE process?
- Recommendations for improving the PLE process?

Guiding Frameworks

The Alberta Education Interim KSAs and the Leader in Me frameworks were used to guide this study. There are seventeen Interim KSAs, which have been grouped into the following five categories (Government of Alberta, 2012):

1. planning;
2. facilitation;
3. assessment;
4. environment;
5. professional responsibilities and relationships.

These five categories were used to develop the learning outcomes and associated assessment activities for each of the courses and field-based experiences in the B.Ed. program (http://tinyurl.com/bedcompetenices). TCs maintain a Google Docs journal (http://tinyurl.com/bedjournal) to reflect on their learning experiences and in initially develop their PLEs in Google Sites to document how they are achieving the Interim KSAs (http://tinyurl.com/plebed).

The Leader in Me framework was developed by Sean Covey et al. (2014) and is based on *7 Habits of Highly Effective People* (Covey, 2004) created by his father Stephen. The rationale for using these seven habits is to help the TCs use their PLEs to develop a *growth mindset* where they are taking responsibility for their learning and collaboratively supporting their peers in the program.

Methods of Investigation

An action research approach was used to direct this study. Stringer (2014) indicates that action research is a reflective process of progressive problem solving led by individuals working with others in teams or as a part of a ‘community of inquiry’ to improve the way they address issues and solve problems. This research approach should result in some practical outcome related to the lives or work of the participants, which in this case is the effective digital integration of personal, classroom, and field-based learning experiences in a B.Ed. program.

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This research approach was utilized in order for the TCs to be *active* rather than *passive* participants in the study. The hope was that by actively participating in this research process the TCs would gain insights and confidence to facilitate a PLE process for their own K to 6 students in the future.

Data collection

A mixture of quantitative (i.e., student surveys) and qualitative (i.e., faculty interviews) were collected. During the fall 2015 semester, the co-investigators conducted semi-structured interviews with faculty members in the B.Ed. program, which were digitally recorded and transcribed (n = 9). All teacher candidates enrolled in the four year B.Ed. program were invited to complete an online survey during the final week of the fall 2015 semester by the two Undergraduate Student Research Assistants (USRA) (n = 187). The purpose of this survey was to collect data about how students had connected their personal, classroom, and field-based learning experiences to document and demonstrate how they were achieving the Interim KSAs. The SurveyMonkey application was used to administer this online survey. The two USRAs and the co-investigators for this study collated the survey results and posted them to an editable Google Document. During the month of December 2015, students and faculty were invited to add comments and recommendations to this Google Doc.

Data analysis

A constant comparative approach was used to identify patterns, themes, and categories of analysis related to the three research questions that "emerge out of the data rather than being imposed on them prior to data collection and analysis" (Patton, 1990; p.390). Descriptive statistics (e.g., frequencies, means, and standard deviations) were calculated for the online survey items using MS Excel. Comments and recommendations from the faculty interviews and student surveys were added directly to the Google Document.

Findings

The findings and key themes for this study are reported for each of the three research questions:

1. How are personal learning environments (PLEs) helping teacher candidates digitally connect their personal, classroom, and field-based learning experiences?
2. What challenges are the TCs encountering with the PLE process?
3. Recommendations for improving the PLE process?

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Digital connections

The faculty interview and TC survey results indicate the teacher education candidates perceive that the professional learning plan process helps them digitally connect their personal, classroom, and field-based learning experiences by:

- having all my learning artifacts in one place to connect, critique, and reflect upon;
- documenting professional growth;
- journaling in each education course and
- peer mentoring and collaboration.

In terms of having all of the learning artifacts in one place, TCs commented that “I think the PLE really brings together all the components of the program, as well as weaving in our personal experiences” (TC survey participant 17) and “It has for sure helped me connect because I’ve had to think more about the things that I was noticing in the elementary school classrooms and having to connect it with the Education course content” (TC survey participant 44).

With regards to documenting professional growth, one student stated that the PLE process “forced me to see the connections and relevance between personal and professional life” (TC survey participant 23) and another student explained that “It allows me to display what I am learning while being able to go back and reflect on what I have learnt. As well it allows me to build on my prior knowledge and to create a stronger professional learning plan” (TC survey participant 33).

Another student commented about the relationship between her course journals and the PLE “I have been able to include artifacts and pictures from my experiences in my PLE that I have first documented in my field journals” (TC survey participant 6).

Finally, a number of students emphasized the importance of the peer mentoring and collaboration that was involved in the construction of their PLEs, “I found that when I created my PLE I was able to input all my experiences into one space and other people were able to see them and provide me with feedback, this made our class stay connected and become a community of learners” (TC survey participant 39) and “It has helped me to become more creative by seeing how the other students in my class think and learning from each of them” (TC survey participant 29).

Challenges

Findings obtained from the faculty interviews suggest that there is currently a tension with the PLE process between being a surface versus a deep learning experience for the B.Ed. students. Faculty perceive that many TCs view their PLEs simply as a “check-list” or “set of hoops to jump through” in order to demonstrate their achievement of the Interim KSAs.

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In addition, the teacher candidates identified a series of challenges, which have been categorized into the following three themes:

1. Clarity of purpose;
2. Time and
3. Digital technology support.

The survey results demonstrated that the teacher candidates are increasingly less clear about the purpose of the professional learning plan as they progress through the program (Table 1).

Table 1: Clarity on the purpose of the professional learning plan

Program Year	Percentage of TCs clear or very clear on the purpose of the PLE
One	78%
Two	70%
Three	58%
Four	46%

The TCs indicate this downward trend is because the PLE process is not being applied to any of the core 3rd and 4th year education courses. "You only work on the P in 1st or 2nd and there is no opportunity to work on it in 3rd year classes or 4th" (TC survey participant 132) and "It would be have been more useful if the PLE was implemented correctly in every course. Some professors emphasized its importance more than others and therefore, there were large gaps in between updates and various inconsistencies that we were required to fix on our own" (TC survey participant 87).

TCs from each year of the program also commented on the challenge of finding the time to work on their PLEs. In first year, "It does take up a lot of time but overall, I found it useful" (TC survey participant 14) while in second year "The least useful part of the PLE process is that it requires time and a lot of thinking to plot information down on each page" (TC survey participant 53). These comments were echoed in third year, "Unfortunately, time is always an issue. I felt as if I may not have had enough time to include insightful artifacts to my PLE" (TC survey participant 114) and emphasized in fourth year "PLEs are mentioned, but we never focus on them or given time to work on them in 4th year. They seem to always be an afterthought, and now I feel like I will be scrambling" (TC survey participant 156).

In addition, the TCs, especially in 1st and 2nd year, emphasized the need for more digital technology support for the creation and maintenance of their PLEs. In first year, "The least helpful part was having to figure out Google Sites on my own after only one workshop. I feel we didn't spend enough time in creating it in class with our peers" (TC survey participant 27) and in second year "I am still not 100% comfortable with how Google Sites works I think it would be really helpful to have a workshop to remind us of the things we learned in year one on how to create and maintain our PLE" (TC survey participant 63).

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Recommendations

In terms of creating a deeper learning experience for the TCs, the faculty members recommended that the PLE process should be revised in order to allow TCs to "tell their stories about how they are developing their professional teaching identities through the digital connection of their personal, classroom, and field-based learning experiences" (Faculty interview 3). In order to achieve this outcome we have begun to examine the digital storytelling research literature (Barrett, 2006; Ehiyazaryan-White, 2012; Jenkins & Lonsdale, 2007; Johnsen, 2012; Robin, 2005; Schank, 2012).

The teacher candidates who participated in this research study provided a number of ideas and suggestions for improving the PLE process. The research team has distilled this "wish list" into four key recommendation themes:

1. designated PLE course for each semester of the B.Ed. program;
2. goal setting versus scrapbooking approach;
3. peer mentorship support and
4. mentor teacher involvement.

One of the key challenges identified by the TCs was the lack of consistent focus and use of the PLE throughout the entire B.Ed. program. In order to remedy this issue, the research team recommends that each semester a core education course be designated for the PLE. This would involve creating an assignment for each of these courses that would provide TCs with a rationale and dedicated time to work on their PLPs along with assessment feedback to help direct their growth and development.

In many of the faculty interviews, concerns were expressed that the TCs approach the PLE as a "check-list" or "set of hoops to jump through". A superficial scrapbooking process rather than a deep and meaningful learning experience. Chen, Grocott, and Kehoe (2016) emphasize that we need to move our pedagogical and technological approaches from "one of checking off boxes to one of connecting the dots" (p.1). Learning artifacts presented in the PLE should be used to "trigger" growth and development goals and action plans as illustrated in Table 2.

Table 2: Teaching competency documentation and planning

PLE Component	Description
Artifacts	Representations of achievement of specific teaching competencies
Reflections	What I learned in the process of achieving this competency
Goals	What future growth and development do I want to achieve for this competency
Strategies (action plan)	What are my plans and strategies for achieving this future growth and development

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The TCs, especially in the 1st and 2nd years of the program, indicated that they would like to have more support for the PLE process. Joubert (1842) is credited with coining the term "to teach is to learn twice" and in a related study Vaughan, Clampitt, and Park (2016) recommend the development of a peer mentoring circle for the B.Ed. program (Figure 2).

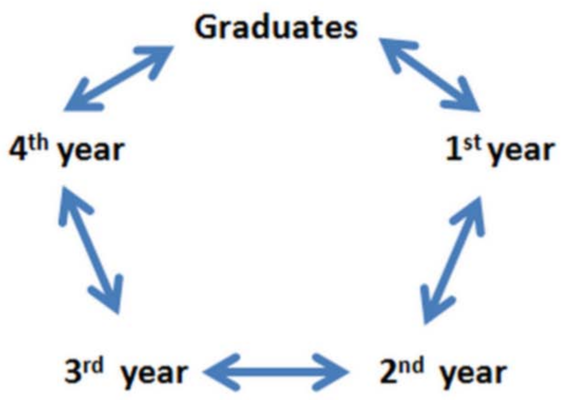

Figure 2. Bachelor of Education peer mentoring circle

In this circular approach, fourth year TCs could receive peer mentor support for their PLEs from recent graduates. Third year TCs could be supported by fourth year peer mentors in their first practicum experience. Second year TCs could receive third year peer mentor support in their assessment course and first year TCs could receive second year peer mentor support in their introductory courses. The development of this peer mentoring circle would provide all TCs with "first hand" mentoring experience to help them become effective teachers and learners. Friessen (2009) has developed a teaching effectiveness framework that emphasizes "teachers improve their practice in the company of their peers" (p.6) and a recent Alberta Education (2014) report advocates that an effective teacher "collaborates to enhance teaching and learning" (n.p).

Currently, conversations about the PLE process are limited to the faculty members and TCs in the B.Ed. program and as the African proverb suggests "it takes a village to raise a child". Several of the TCs, in the online survey, recommended that the mentor teachers for field placements and practicums should be more involved in these conversations. In first year, the TCs recommend that mentor teachers should be made more aware of the B.Ed. teaching competency framework (planning, facilitation, assessment, environment, professional roles and responsibilities) so that they can provide advice and guidance related to these key outcomes. In second year, they suggest that this conversation should be broadened to include topics such as; inquiry, digital technology integration, literacy acquisition, lesson planning, and assessment. And, finally in third and fourth year, they stress that there should be a much greater emphasis on conversations with mentor teachers about unit planning, diversity, and inclusive education.

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Next Steps

Based on an analysis of the findings and recommendations, from the faculty interviews and TC online surveys, the research team has begun to develop a guiding document and "roadmaps" for the B.Ed. program's PLE process. The guiding document contains the framework, template, examples, and resources for the PLE process (http://tinyurl.com/plebed). Given the complexity of the PLE process, the research team has begun to create two maps; one for year one and two of the program (http://tinyurl.com/plpyear1and2) and one for year three and four of the program (http://tinyurl.com/plpyear3and4). Each map consists of the core education courses designated for the PLP process with suggestions for artifacts, reflections, goals, and action plans.

The research team speculates that a growing number of Bachelor of Education programs are using a PLE or ePortfolio process to document and assess teacher candidates' growth and development. They hope that other researchers will be able to use and build upon the results of this study in order to help teacher candidates digitally connect their personal, classroom, and field-based learning experiences in order to document and demonstrate how they are achieving their B.Ed. program outcomes.

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LEARNING ANALYTICS IN DISTANCE EDUCATION: A SYSTEMATIC LITERATURE REVIEW

Selcan Kilis, Giresun University, Yasemin Gülbahar, Ankara University, Turkey

Summary

The emerging field of *learning analytics* requires the attention of scholars due to it being a fairly new area in which limited research has been conducted. This study as a systematic literature review of studies that focused on learning analytics in any format of distance education, with qualitative content analysis conducted on the retrieved studies. With this aim, two leading databases, ERIC and Science Direct, were searched in order to ascertain the existence of the related research using five sets of keywords: “learning analytics”, “learning analytics in open learning”, “learning analytics in distance education”, “learning analytics in blended learning” and “learning analytics in e-learning”. The retrieved research studies were first examined based on their relevance with their settings, specifically any format of distance education. After excluding duplicates and conference proceedings, the remaining research studies were analysed one by one. Only those studies and the ones conducted using empirical and/or practical data were accepted for this current study. The accepted 25 research studies were then reviewed based on their participants, applied methodology, data sources, and data analysis techniques in order to reveal patterns of existing research about learning analytics in distance education as a means to drawing up a general picture, and to provide insight for further research. The review of related studies is also discussed and conclusions drawn in order to add insight to this emerging field.

Introduction

The advancement in technology has provided the means to track the behaviours of learners in web-based learning environments. How learners interact with their classmates and instructors, how they surf the web environment, and their every mouse-click on any document or any part of a web-based learning environment are stored as data in the background. How learning and teaching benefits from these stored data has provided new insight and the new scholarly field of *learning analytics* has emerged. Learning analytics (LA) is a recently emerging field which uses this background data to enrich learning and teaching experiences with the help of business intelligence, web analytics, educational data mining, and action analytics. It has been defined as “the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs” (Long & Siemens, 2011, p.32).

Learning analytics offer a premise for predicting and improving learner success and retention, allowing for data-driven decisions (Olmos & Corrin, 2012; Smith, Lange, & Huston, 2012). With the help of learning analytics, curriculum can also be enhanced to include more comprehensive programmes (Gülbahar & Ilgaz, 2014; Long & Siemens, 2011). Learning analytics also facilitate personalised learning, enabling learners to have a more effective learning experience. It also guides instructors in grading learners' performances, keeping track of their logs, their engagement and pace (Smith et al., 2012). Actually, the purpose of learning analytics is stated as being to encourage and motivate instructors and educational institutions to adapt educational opportunities in accordance with learners' level of needs and ability (Johnson, Adams, & Cummins, 2012).

The technological and educational aspects of learning analytics, as mentioned in Greller and Drachsler's study (2012), include educational data, objectives, stakeholders, internal limitations, external constraints, and instruments. Educational data feeds learning analytics as well as some challenges such as availability. The aspect of objectives refers to the fundamental objectives of learning analytics and includes two main dimensions: reflection and prediction. Reflection serves as the critical self-evaluation of a data client like self-observation, or working similar to human-computer interaction. Prediction facilitates establishing acts of automatic decision making for learning paths with the aim of predicting and modelling learning activities. Stakeholders include data clients (e.g., teachers) and data subjects (e.g., learners). Internal limitations refer to the human factors which enable or pose barriers, such as competencies and acceptance. External constraints refer to the outside barriers which can limit the beneficial applications of learning analytics. Finally, instruments are means of dealing with datasets including technology, algorithms, and theories. The authors concluded their proposed framework for LA application with their statement that optimal exploitation of LA can occur only if all six critical dimensions in the design process are taken into consideration.

Research on LA, after some attention to the aforementioned dimensions, has started to focus on ways and methods to interpret big data for learning purposes. The point worth noting here is the software used in the analysis of tracked data. Tools utilised for learning analytics include Purdue's Course Signals Program, Blackboard Analytics, SNAPP (Social Networks Adapting Pedagogical Practice), Gephi and Northern Arizona University GPS, Google Analytics, and Moodle Analytics. These tools display learners' interactions that are stored in the background as either some form of visualisation e.g., social network analysis techniques or in the format of sociogram which consists of nodes (students) and links (communication, message exchanges, replies of forum postings) showing central and isolated learners (Park & Jo, 2015). Other software used to visualise this stored data for learning include Wolfram, NodeXL (Network Overview, Discovery and Exploration for Excel), and radar charts.

Initial attempts with LA started with pioneer universities including Purdue University, University of Alabama, and Arizona State University. After the field started to gain more attention, a steadily growing body of literature has materialised; however, there are still gaps

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in the literature. This current study attempts to provide an overview of LA in distance education as a means to bridge the gap and reveal existing patterns.

Methodology

The purpose of this current study is to review the existing literature published on the subject area of learning analytics in distance education in order to reveal the current status of the field, and the methodologies applied as a means to guide further research. With this aim, this current study systematically reviewed the related literature using the phrase *learning analytics* in two leading databases, ERIC and Science Direct. Of the studies identified, only those with available full text were included in the current study. Duplicates and conference proceedings were then discarded; however, since there were many duplicates, the number was seen to decline remarkably. In accordance with the aim of this study, a set of keywords (see Table 1) were used in searching for existing research without the restriction of any time period. Results of these searches are presented in Table 1.

Table 1: Results from Systematic Review of Studies in Learning Analytics in Distance Education

Searched keywords			Database	
			ERIC	Science Direct
"learning analytics"			85	221
Journal articles			67	190
Full-text available			57	156
"learning analytics"	&	"online learning"	14	55
"learning analytics"	&	"online teaching"	-	13
"learning analytics"	&	"online education"	10	24
"learning analytics"	&	"blended learning"	1	12
"learning analytics"	&	"blended teaching"	-	2
"learning analytics"	&	"blended education"	-	6
"learning analytics"	&	"distance learning"	8	11
"learning analytics"	&	"distance teaching"	6	4
"learning analytics"	&	"distance education"	7	12
"learning analytics"	&	"electronic learning"	9	1
"learning analytics"	&	"e-learning"	13	29
"learning analytics"	&	"open learning"	3	1
"learning analytics"	&	"open teaching"	-	-
"learning analytics"	&	"open education"	1	-

Selected studies were reviewed one by one, based on the chosen criteria of relevance with the settings of any form of distance education and research conducted based on empirical data. The selection process resulted in 25 empirical study journal articles being identified that related with any form of open distance education. These articles were then analysed based on qualitative content analysis. The results are explained in the next section.

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Results

This study is a systematic review of related literature about learning analytics in distance education, specifically designed as a qualitative content analysis. Of the retrieved studies, 25 were included in the analysis depending on their relevance with distance education settings. The criteria to investigate retrieved studies included the learning setting, applied methodology, data sources, and data analysis. Findings from content analysis of the 25 studies are shown in Table 2 by author and year published.

Table 2: A Systematic Review of Studies in Learning Analytics in Distance Education

Author(s) & Publication Year	Participants	Applied Methodology	Data Sources	Data Analysis
Bainbridge, Melitski, & Zahradnik (2015)	Graduate students	Quantitative	Student log data	Inferential statistics (logistic regression)
Cambruzzi, Rigo, & Barbosa (2015)	Undergraduate students	Case study	Experiment	Qualitative analysis
Fidalgo-Blanco, Sein-Echaluce, García-Peñalvo, & Conde (2015)	Undergraduate students	Quantitative	Student log data	Descriptive statistics, inferential statistics (correlation)
Goggins, Galyen, Petakovic, & Laffey (2016)	Undergraduate students	Mixed method	Interview, survey, ethnographic field notes, assignments	Both qualitative and quantitative (network analytic), social network analysis
Goggins, Xing, Chen, Chen, & Wadholm (2015)	Undergraduate students	Qualitative	Student log, chat	Observations, complex models such as tree-based algorithms and neural networks
Hernández-García, González-González, Jiménez-Zarco, & Chaparro-Peláez (2015)	Undergraduate students	Case study	Student log data	Social network analysis, visualisation, inferential statistics (correlation, ANOVA)
Jo, Park, Yoon, & Sung (2016)	Undergraduate students	Quantitative	Student log data, survey	Structural equation modelling
Junco, & Clem (2015)	Undergraduate students	Quantitative	Student log data	Descriptive statistics, inferential statistics (hierarchical multiple regression)
Kagklis, Karatrantou, Tantoula, Panagiotakopoulos, & Verykios (2015)	Graduate students	Quantitative	Discussion, student log data	Descriptive statistics, text mining, social network analysis, sentiment analysis
Kim, Park, Yoon, & Jo (2016)	Undergraduate students	Quantitative	Discussion, proxy variables, student log data	Data mining techniques, random forest (RF) technique
Laflen, & Smith (2016)	Undergraduate students	Quantitative	Student log data	Descriptive statics, inferential statistics
Lonn, Aguilar, & Teasley (2015)	Undergraduate students	Design based research	Student log data, surveys	Inferential statistics (paired sample t-test, multiple regression)
Macfadyen, & Dawson (2012)	Undergraduate students	Case study	Student log data, observation, collective discussions, documents	Descriptive statics, inferential statistics (correlation), visualisation techniques
Martin, & Whitmer (2016)	Undergraduate students	Quantitative	Student log data, interaction data	Descriptive statistics, inferential statistics (ANOVA, MANOVA, correlation)
Park, & Jo (2015)	Undergraduate students	Case study	Interview, survey	Rapid prototyping, usability test, descriptive statistics
Park, Yu, & Jo, (2016)	Undergraduate students	Case study	Student log data	Data mining techniques (Latent Class Analysis method as a clustering approach), descriptive statistics
Prinsloo, Archer, Barnes, Chetty, & Van Zyl (2015)	Undergraduate students	Case study	Student log data	Qualitative analysis
Rienties et al. (2016)	Undergraduate students	Quantitative	Student log data	Decision making, qualitative
Ruipérez-Valiente, Muñoz-Merino, Leony, & Kloos (2015)	Undergraduate students	Quantitative	Student log data	Visualisation techniques

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Tempelaar, Rienties, & Giesbers (2015)	Undergraduate students	Case study	Student log data, surveys	Statistics tracking, inferential statistics (correlation), prediction modelling
Tobarra, Robles-Gómez, Ros, Hernández, & Caminero (2014)	Graduate students	Quantitative	Student log data	Semantic analysis, network analysis
Van Leeuwen, Janssen, Erkens, & Brekelmans (2015)	Undergraduate students	Experimental study	Student log data, diagnosis, interventions	Descriptive statistics, inferential statistics
Volk, Kellner, & Wohlhart (2015)	Secondary education	Quantitative	Student log data	Inferential statistics (logistic regression)
Xie, Yu, & Bradshaw (2014)	Undergraduate students	Mixed method	Student log data, discussion	Social network analysis, inferential statistics (correlation, multiple regression, paired-samples t-test), qualitative analysis of discussion transcripts
Yasmin (2013)	Graduate students	Quantitative	Student log data	Data mining approach (classification tree), descriptive statistics

As can be seen in Table 2, the studies selected in relation with learning analytics in distance education were published between 2012 and 2016, inclusive. The majority of studies (56%, n = 14) were published in 2015, followed by 2016 (28%, n = 7). Two studies were published in 2014, whereas there was only one in both 2012 and 2013. When reviewing the literature, it is apparent that studies commenced in this area in 2011, but they are mostly review or theoretical studies. Empirical studies started later and gained popularity especially within 2015. The majority of the research (80%, n = 20) was performed at the university-level of education, i.e., with undergraduate students. Four research studies were conducted with graduate students and one was undertaken with secondary education students. Distribution analysis of research studies based on applied methodology shows that 52% (n = 13) were purely quantitative, 28% (n = 7) were case studies, 8% (n = 2) were mixed-method, 4% (n = 1) was purely qualitative, 4% (n = 1) had an experimental design, and 4% (n = 1) employed design-based research. According to the data sources used, most (88%, n = 22) used student log data stored in the background of e-learning module, while three (12%) did not use a student log. Finally, in regard to data analysis, more than half (60%, n = 15) applied learning analytics methods such as sentiment analysis, social network analysis, neural networks, etc., as well as data-mining techniques like classification tree, and random forest technique. Of those research that applied learning analytics methods, 32% (n = 8) applied only statistical analysis methods, whereas 8% (n = 2) used qualitative analysis.

Overall, of the 25 empirical research studies that were reviewed, based on content analysis, it was seen that most were published in last two years (i.e. as from 2015). Many focused on university-level education, especially at the undergraduate level. Research design variants included mixed-method, case study, experimental design, and design-based research, etc. It can be inferred that there is a variation in the applied methodology. The most frequent data source used was, as expected, the log data stored in the background of user applications. Researchers mostly analysed data using learning analytics techniques such as network analysis. The emerging point in the data analysis is the use of statistical methods, specifically structural equation method and multiple regression techniques. It is clear that there is a variation in criteria including applied methodology, data sources and data analysis techniques.

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Conclusion

This systematic review study indicates the overall disposition of existing literature on learning analytics in distance education and provides research insight into the conceptual basis of this recent emerging field. Content analysis has shown that research focused on log data stored in the background of e-learning platforms or modules. This data was then analysed using learning analytics techniques and data mining approaches, as well as structural equation modelling and regression analysis. Learning analytics techniques and data mining approaches also provide information about the learners' disposition in regard to their centrality, activeness, participation, interaction, and so on. The more important issue is the usage of such results about students' network disposition in the learning community in order to increase the learning quality and its effectiveness as expected in learning analytics. However, stored data from student logs could be better interpreted with the inclusion of other data such as real logs, actual time spent and real interactions rather than logs and clicks, etc., since users could have spent time in the learning environment for other purposes, i.e., not for learning purposes, but maybe for surfing, or other misleading data types.

Stored data could be improved with more details to serve to the needs of educators, students, and researchers. In the same way, the analysis techniques could be more sophisticated with the addition of network analysis and sentiment analysis etc. The issue of understanding the deeper learning processes is more than analysing just user 'clicks' and trying to interpret them. Learning process include students' efforts and performances as well as their psychological, behavioural, and emotional states. Overall, special attention to the development of learning analytics as a whole including the methods, techniques, culture, policies etc., is required in order to promote the quality of learning and teaching in addition to guiding learners and/or instructors rather than focusing solely on the outcomes via trivial measures.

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CREDIT, TRUST AND OPEN EDUCATION

Katherine Sutherland, Thompson Rivers University, Canada

Summary

I am in the preliminary stages of exploring the relationship between trust, credit and credential granting, quality assurance, and open education. I work at an institution where the Open Learning division was originally an independent institution; on April 1, 2005, the British Columbia Open University (BCOU) amalgamated with the University College of the Cariboo to form Thompson Rivers University (TRU). The existing programs and courses of BCOU became a division of the newly formed Thompson Rivers University. There is a complex political history behind this merger, but what may be common to many open education enterprises is the lack of trust with which BCOU was regarded by the traditional bricks-and-mortar faculty, staff and administration: the credit and credentials granted by BCOU were not regarded as quality-assured by TRU members. In this poster, I propose to explore the relationship between credit and credential granting, trust, and quality assurance, with a goal of working toward strategies for linking these practices to open education. The purpose of this poster is to define the research questions that might lead to the development of these strategies.

Credit and Credential Granting

The issue of credit assessment and recognition

In a typically reactionary comment, Coté and Allahar write in *Ivory Tower Blues* that "…Canadian Universities have already slid in the direction of becoming credential 'markets,' much like large supermarkets where people shop using a list of their needs and wants" (2007; pp.65-66). There are several assumptions underlying this statement. First, there is an elision of considerations of quality assurance in the face of market forces and student consumption habits in the context of education. Second, there is an implication that credits or credentials may be purchased rather than earned. And finally, there is a sense of impending disaster: the subtitle of the book is, after all, "A University System in *Crisis*" [my italics]. This sense of impending crisis is arguably worse in the context of open education, particularly when that includes alternative credentialing (such as badges and mini-credentials), assessment and recognition of prior learning (PLAR), and low residency rates. At TRU, the residency rate for an Open Learning bachelor's degree was 9 credits at the time of the merger; this caused particular upset to the traditional faculty and became an issue for Senate. Thus, the first point to consider is competing definitions of credit (leading to a credential).

Definitions of credit

According to John Harris in a *Brief History of American Academic Credit System* (2002), in the 18th and 19th centuries, "Students stood comprehensive examinations, which were often oral and public."

E.M. Coulter describes these public exams: "The senior examination was guarded with particular care because the Bachelor of Arts degree was given [to] those who were successful. This examination was a 'general one, upon all the studies of both the two last years and many of the preceding years,' or, as the rules ran, it should be 'rigid, and extend to the whole of collegiate literature'" (p.52).

This style of exam is still undertaken at the graduate level in North America and in some European contexts.

The key point here for the purposes of this study is that trust in the quality of the credit to be granted was established in a highly public way: the public could scrutinize the performance of the candidate and thus be assured of the quality of learning. This is a performative, embodied approach to quality assurance. As A. Lee Foote writes, "in the United Kingdom, Scotland, Germany, and a few other European countries, the more common term for the PhD oral exam is *viva voce*, literally translated as 'living voice' or 'word of mouth'" (2015; p.5).

One of the pressing concerns for the traditional academy about open education is that technology gives the impression of a *disembodied* learner in the virtual learning environment: this leads to distrust of quality of the learning, the credit granted, and by extension the credential. This is closely linked to concerns about increased violations of academic integrity.

The first question to be addressed in this work, then, is how to establish trust and assure quality in an open education context.

Questions of Credit and Trust

Defining credit

Notably and interestingly, the definitions of *credit* and *trust* overlap in English. The 1542 English definition of credit is: "Belief, credence, faith, trust. To give credit to: to believe, put faith in, credit" (OED).

Questions to be considered here include the following:

- How does this definition pertain to the concept of academic credit?
- Have we lost *faith* in academic credit?
- Does this historical notion of *credit* as *faith* or *trust* apply to academic credit?

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The Carnegie unit

In an effort to allow for electives and greater educational flexibility, in the 19th century Harvard undertook a curricular reform project.

The Carnegie Unit was introduced in late 19thc as measure of high school progress and completion. Importantly, it is based on student hours of study—120 hours of class time over a year.

The collegiate/ academic credit was introduced in 1869 by Charles W. Eliot at Harvard with the emergence of elective courses, which could not be assessed through a single comprehensive exam system. These credits were also based on contact hours. Though the simplicity of quality assurance through the public comprehensive exam was lost, it is critical to note that this was sacrificed in favour of more *open,* flexible educational programs.

The research question here is to explore historically how trust and quality assurance were re-established in the wake of curricular reform.

This links to the emergence of accreditation practices and organizations. Is an accreditation system inevitable in the wake of curricular reform?

The Monetization of Academic credit

Perhaps the most complicated consequence of the adoption of the modern, disembodied, abstract notion of academic credit was the almost immediate reduction of academic credit to a curricular accounting system, in which credits are quickly monetized. *Credit hours* are commonly used as the basis for calculating tuition fees, student loans, and faculty salaries and workloads.

In this context, "The credit system makes the university a banking system," as John Harris puts it (2002; p.4).

Can academic credit be decoupled from academic financial systems?

The "Inflation" of Academic credit

As with any "currency," inflation is a concern. In fact, many are worried that credit inflation has already occurred.

In Ivory Tower Blues, Coté and Allahar argue that "…students have come to universities with higher expectations about the grades to which they feel entitled. This situation has intensified in direct proportion to the increase in enrolments in Canadian universities, as the competition to gain entrance increases. As more and more students with inflated grades, but lower levels of academic interest and ability, have entered Canadian universities year after year, many professors have given in by watering down their courses and inflating grades" (2007; p.19).

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It is fascinating to note here that the students are made responsible for the devaluing of credits—credits over which they actually have no control in terms of quality assurance. The professors are somehow victims in this scenario, in which students are reduced to demanding, entitled consumers. Yet surely it is not students but the academy that must be in a position of *trust* in assuring the *value* of the *credit.*

Defining trust

The monetization of the credit system links to the definition of trust a form of monetary assurance. In English, trust may be defined as follows: "The confidence reposed in a person in whom the legal ownership of property is vested to hold or use for the benefit of another; hence, an estate committed to the charge of trustees; also *transf.* a trustee; a body of persons appointed as trustees." (OED)

One might argue in this context that academics and institutions act as trustees of the credits, credentials and, ultimately, the educations of their students—which are very valuable, after all. As such, the quality of these things must be assured by the trustees to the extent that they do not lose value in the open market.

It is fair to say that open education credits (or trusts) are the most vulnerable to the vicissitudes of the open market.

Another question emerges here: how might the value of the investment by a student in an *open* education be assured in the *open* market?

Again, this is a matter of trust.

In an interesting circularity of meaning (or a semiotic circularity), trust is defined by the meaning of credit, much as credit above was defined by trust. The OED definition of *trust* in English from about 1200 is "Confidence in or reliance on some quality or attribute of a person or thing, or the truth of a statement." This recalls the definition of credit from 1542: "Belief, credence, faith, trust. To give credit to: to believe, put faith in, credit."

The question emerging here is: How can trust and quality be assured with regard to open education credits when the very definition of credit is trust… and vice versa?

Trust and credit in an open education context

More specifically, this project will explore the questions above in an open education context, asking how, in the context of an open credit system, we might accommodate the ongoing digital transformation of the academy whilst assuring a "gold standard" of trust?

In DIY U: Edupunks, Edupreneurs, and the Coming Transformation of Higher Education, Anya Kamenetz (2010) explores concepts like:

- copy-left;
- open;

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- digital learning as “a process of way-finding, social sense-making” (George Siemens);
- “situated learning” and “communities of practice” (Lave & Wenger);
- “educational ecosystems” (Richard Ludlow).

These are exciting ideas, but they only have value if the credentials they lead to also have value.

Conclusion & areas for further study

As trustees of the students’ investments of time and money in their educations, the answers to the questions above are pressing and land squarely on the shoulders of educators involved in open educations systems.

Further development of the research would use mixed methods to answer the questions above, including:

- Interviews with open and traditional educators regarding trust and credit in open education;
- Interviews with open and traditional students regarding trust and credit in open education;
- Analysis of open student success in both further educational attainment and employment, in collaboration with IPA departments, initially at TRU and later including Athabasca in Canada;
- Further analysis of open student success in both further educational attainment and employment, in collaboration with IPA departments.

At this poster session, I would be seeking ideas from research colleagues about methods for further study.

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SUPPORTING THE CAPACITY DEVELOPMENT OF CANADIAN ENTREPRENEURIAL MOTHERS THROUGH AN EXPLORATION OF THEIR DIGITAL LEARNING ECOLOGIES

Nicole Christen, Albert Sangrà, Open University of Catalonia,
Mercedes González-Sanmamed, University of A Coruña, Spain

Summary

This poster presentation will discuss the rationale for an early-stage research project exploring the digital learning ecologies of Canadian entrepreneurial mothers, focusing on the dimension of informal learning. This presentation is relevant to the theme of *Emerging Distance Education Systems and Theories*, particularly *lifelong and self-determined learning*. The purpose of this research study is to gain a better understanding of digital learning ecologies, and the informal learning that occurs within them, for the purpose of capacity development as it pertains to self-actualization among Canadian entrepreneurial mothers. Specific studies on each of the topics concerning this research do exist so the step going forward will be to find their possible connections and, particularly, to identify how to support and foster capacity development for entrepreneurial mothers, for whom their special characteristics and constraints limit their possibilities for accessing formal professional development. The presentation will highlight each of the pillars of the study, the research objectives, the significance of this study with regards to the theme of *Emerging Distance Education Systems and Theories* (particularly *lifelong and self-determined learning*), and the expected results.

Introduction

The primary objective of the research is to explore how Canadian entrepreneurial mothers scaffold and develop their digital learning ecologies for capacity development through informal learning. The questions guiding the research toward the accomplishment of this goal are:

- What do the experiences of Canadian entrepreneurial mothers tell us about their digital learning ecologies?
- How do Canadian entrepreneurial mothers use digital learning ecologies for capacity development?
- What are the factors that benefit or hinder the potential of digital learning ecologies for capacity development?

This study will be strengthened by a mixed methods research design. Its integrated, multidimensional, and pragmatic nature sets it apart from the existing body of research through the expectation that it will deliver recommendations for guidelines, strategies, and actions regarding the development of digital learning ecologies for informal learning, that might help other Canadian entrepreneurial mothers, and potentially other populations, with capacity development. The expected results include the identification and description of new conceptual dimensions pertaining to digital learning ecologies, informal learning, entrepreneurial women, capacity development and the interrelationships among these focal points.

There is a need for new approaches to workforce development and attention to learning that occurs outside of traditional institutions (Facer & Sandford, 2010). The research first aims to answer how populations facing barriers to self-actualization, such as mothers, develop digital learning ecologies for the purpose of informal learning. Answering this provides the foundation for the exploration of an even more important question: How do digital learning ecologies support capacity development?

Theoretical Framework

A report by UN Women (n.d.) states that economies grow when the number of women in paid entrepreneurship, increases. Furthermore, according to the government-assigned Expert Panel on Championing and Mentorship for Women Entrepreneurs:

> *"The economic empowerment of Canada's women is considered to be of strategic importance to Canada's future prosperity. With female majority-owned small and medium-sized enterprises (SMEs) contributing an estimated $148 billion in economic activity in 2011, helping women grow their businesses and improve their survival rates will result in a meaningful impact on economic development, job growth, tax revenues and international trade for Canada." (Dickinson, Bosela, Cross, McTasney, & Close, 2015; p.1)*

Motherhood creates a barrier to self-actualization, limiting women in terms of their career and earning potential (Goldin, 2014; Kawash, 2011; Principe & Culbert, 2014; Slaughter, 2015). The workplace of many entrepreneurial mothers is unique in that they work from home, in a socially isolated setting, which results in the loss of social capital (Kamberidou, 2013; Valtchanov, Parry, Glover, & Mulcahy, 2014). At the same time, entrepreneurial mothers face unique challenges as they strive to grow their business while accommodating the demands of raising a family (Jean & Forbes, 2012). They often work fragmented hours as a result (Jean & Forbes, 2012). The United Nations Commission on the Status of Women (UNCSW) adds that women's unpaid care work and the fact that women shoulder the bulk of household work limits their participation in economic activities (UN Women, n.d.). Jean and Forbes (2012) define a mompreneur as "a woman who had at least one child at the time of business start up and who is the owner of at least 50% of the business."

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To shatter the glass ceiling, capacity development needs to be understood as a concept that is broader than economic development. For the sake of this study *capacity development* refers to a process that occurs at all levels: individual, organizational, societal, and environmental (OECD, 2006). The process of capacity development stimulates, develops, strengthens, and maintains capabilities over time through knowledge, skills, systems, and institutions for the purpose of achieving social and economic goals (CADRI, n.d.; UNISDR, 2009). The focus of this study will be on capacity development at an individual level, with regards to moving Canadian entrepreneurial mothers upward on Maslow's (1943) hierarchy of needs towards self-actualization, which Maslow defines as doing what we are fitted to do.

Barron (2004) and Jackson (2013) explain the concept of a learning ecology, arguing the complexity of this term and how it defines more than a physical or virtual learning space (Barron, 2004). They state that learning ecologies are centred around an individual learner and consists of a variety of different contexts. These contexts include different resources, relationships, interactions, activities, and learning spaces (Barron, 2004; Jackson, 2013). Jackson (2013) notes the pervasive and fluid nature of learning ecologies, adding "our learning ecologies connect our moments and the thoughts and actions we undertake in such moments and organises them into more significant experiences through which we can begin to see new patterns of understanding and learning" (p.7). He posits that an individual's learning ecology is comprised of five integrated elements: context, resources, will and capability, process, and relationships.

Jackson (2013) combines the perspectives of Lemke (1997, 2000), Barron (2006), and Tough (1971) to refine the definition of a learning ecology as "the process(es) I create in a particular context for a particular purpose that provide me with opportunities, relationships and resources for learning, development, and achievement" (p.14).

Williams, Karousou, and Mackness (2011) explore the concept of emergent learning networks as a mode of learning within a Web 2.0 environment. They discuss how the interactive nature of Web 2.0 creates the conditions for social connection and collaboration, which affords emergent learning embedded within one's personal learning ecology. Therefore, digital learning ecologies can be conceptualized as specific dimension of an individual's learning ecologies and this dimension will be the focus of the proposed research.

Jackson (2013) describes different learning dimensions of different learning ecologies ranging from formal, supported learning to independent, self-directed learning. Thus, like digital spaces are one dimension of learning ecologies, informal learning can be viewed as a dimension embedded within digital learning ecologies.

Coombs and Ahmed (1974) and Tough (1979) introduce the concept of informal learning as learning that occurs outside of formal institutions. Tough (1979) further defines informal learning as intentional and self-directed. Tough (1979) also notes that adults devote considerable time to self-directed learning activities. Schugurensky (2000) argues that

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informal learning is a broad concept that includes self-directed learning as one dimension, but also encompasses incidental and tacit learning. Similar to Jackson (2013), Eraut (2004) prefers to describe learning as a continuum with formal learning on one end and informal learning on the other. He places what Schugurensky (2000) would call incidental and tacit learning on the far end of the informal side and Tough (1979)'s intentional, self-directed learning more in the middle of the continuum. Finally, Brown (2000) adds that informal learning often involves social learning as understanding is co-constructed with others, forming a learning ecology.

Because of the unique constraints of motherhood, mentioned earlier, many Canadian women pursue entrepreneurship a flexible alternative to the traditional workforce (Kawash, 2011; Goldin, 2014; Jean & Forbes, 2012; Status of Women Canada, n.d.). This has resulted in a call for capacity development initiatives within Canada to help Canadian women succeed as entrepreneurs (Mompreneurs Momentum Enterprise of Canada, n.d.; Dickinson et al., 2015).

Studying entrepreneurial mothers in a developed country, such as Canada, provides the opportunity to explore capacity development in terms of self-actualization. In other words, choosing Canadian entrepreneurial mothers as the population to be researched creates the opportunity to explore capacity development above the poverty line. A study by Jean and Forbes (2012) on the factors that motivate Canadian mothers to pursue entrepreneurship indicates that Canadian mothers do not pursue entrepreneurship solely for financial gain. Other important motivating factors that drive mothers in Canada to pursue an entrepreneurial venture include "the desire to put their skills to use, to have something just for them or their children, and to help people" (p.123). This supports the notion of viewing capacity development broadly, not simply in terms of economic advantage.

During the research study, patterns are expected to emerge that describe and explain the possibilities for informal learning within the digital learning ecologies of Canadian entrepreneurial mothers, including the factors that benefit or hinder the potential of digital learning ecologies for capacity development. Additionally, theoretical congruence is expected with seminal works in the fields of informal learning, social learning theory, constructivism, communities of practice, capacity development, female entrepreneurship, and feminism relating to motherhood. New dimensions and concepts that emerge from this study will extend the breadth and depth of our understanding of the relationship between digital learning ecologies and informal learning, and the potential this relationship holds for capacity building in populations, like mothers, who face barriers to self-actualization.

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THE ROLE OF LEARNING DESIGN AND LEARNING ANALYTICS IN MOOCS

Francis Brouns, Olga Firssova, Welten Institute – Research Centre for Learning, Teaching and Technology of the Open University of the Netherlands, The Netherlands

Summary

The last couple of years there have been a lot of attention for MOOCs. More and more universities start offering MOOCs. Although the open dimension of MOOC indicates that it is open in every aspect, in most cases it is a course with a structure and a timeline within which learning activities are positioned. There is a contradiction there. The open aspect puts MOOCs more in the non-formal professional learning domain, while the course structure takes it into the formal, traditional education domain. Accordingly, there is no consensus yet on solid pedagogical approaches for MOOCs.

Something similar can be said for learning analytics, another upcoming concept that is receiving a lot of attention. Given its nature, learning analytics offers a large potential to support learners in particular in MOOCs. Learning analytics should then be applied to assist the learners and teachers in understanding the learning process and could predict learning, provide opportunities for pro-active feedback, but should also results in interventions aimed at improving progress.

This paper illustrates pedagogical and learning analytics approaches based on practices developed in formal online and distance teaching university education that have been fine-tuned for MOOCs and have been piloted in the context of the EU-funded MOOC projects ECO (Elearning, Communication, Open-Data: http://ecolearning.eu) and EMMA (European Multiple MOOC Aggregator: http://platform.europeanmoocs.eu).

Setting the scene

MOOCs currently receive a lot of attention, although it is not always clear to what purpose MOOCs are being exploited. Literature does not provide a clear picture on this yet. Sometimes universities make MOOCs available as a form of advertisement and to attract students. On other occasions, teachers and professors run MOOCs to gain more personal exposure (Evans & Myrick, 2015). In some cases, universities experiment with MOOCs to innovate their online environments or pedagogies (Kiers & Jorge, 2015).

MOOCs, defined as Massive Open Online Courses, open in every aspect, available for anyone, for free, are still considered to be courses. The last letter C for course implies a set structure and a timeline within which learning activities are positioned that could be seen as a contradiction to the other dimensions, massive, open, and online. The latter dimensions would position MOOCs much more as a non-formal learning opportunity, continuous or professional development of lifelong learning instead of teacher driven approaches of formal education courses.

Another big trend is the move towards big data, datamining and analytics. In educational context often referred to as learning analytics, even if these techniques are being used in different domains or being applied for different purposes. The aim of learning analytics should be to provide information about the learning process to the various stakeholders involved in education and learning (Greller & Drachsler, 2012). When directed at learners, learning analytics in combination with visualisations in learning analytics dashboards could provide valuable learning support to learners (Ferguson & Shum, 2012). For example, it can provide progress information and other individualized support in a MOOC setting where a teacher is not able to provide the individual attention that can be given to students and learners in traditional education or even online education (Brouns et al., 2015). For teachers, learning analytics offers aggregated views over learning process, indicating overall progress and performance. Moreover, results could feed design improvements (Lockyer, Heathcote, & Dawson, 2013).

At the same time, this particular use of learning analytics positions MOOCs away from non-formal learning as it tends to put too much focus on progress, performance and drop-out, characteristics that are important in formal education, but less so in non-formal learning contexts in which the learner determines personal learning goals.

Often learning analytics is being implemented without a proper underlying model or without having a clear idea of its purpose. It then can easily turn into a hype: "let's do this because everybody else is doing it, and let's start collecting data and see what we can make of it". Even if this can be a valid approach in the big data, datamining or computer science domains, because their main aim is often the development and testing of algorithms and determining patterns, in a learning context it should be developed and implemented with more care, even if only because of ethical reasons and confidentiality of data.

Having said this, learning analytics could potentially fulfil a valuable role in online learning and MOOCs when certain conditions have been met.

In this paper we would like to make two claims. First, a MOOC needs to be designed to cater for its heterogeneous learner population, and offer sufficient flexibility to allow potential learners to reach the desired learning gain (Brouns et al., in press; Kalz & Specht, 2013). In doing so, the most appropriate pedagogical approaches need to be chosen to allow teachers and tutor teams to support the learners in a most efficient and effective manner, without the personalised instruction and feedback common in formal education. Second, dependent on

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the instructional design and pedagogical models chosen, a learning analytics approach should be thought-through and designed in conjunction with overall MOOC design. We will show several examples of various pedagogical approaches that are based on our experiences in online distance teaching in higher education and in MOOCs. Our evaluation of these approaches led us to extract characteristics that are suitable for a MOOC context. These approaches have also been piloted in MOOC designs in the context of some of the EU funded projects we participate in, such as EMMA (European Multiple MOOC Aggregator: http://platform.europeanmoocs.eu) and ECO (Elearning, Communication, Open-Data: http://ecolearning.eu).

Learning design approaches for MOOCs

A task-centred approach

The educational approach followed by the Open University of the Netherlands in its open online learning is based on active learning design principles that are aimed at optimising learners' learning experiences and performance. Learning design principles are applied to activate and engage learners through meaningful learning tasks and activities that are anchored in the state-of-the art in the domain and have professional relevance for participants.

In order to cater for a broad target group of professionals of varying expertise levels, with different learning needs and time available for learning, MOOC design includes tasks of several complexity levels. At basic level, learning tasks integrate introductory learning activities with activities that stimulate learners to interact with the content and with each other reflecting on relevant practice-based cases, linking the new theoretical knowledge acquired in the course with their own practice and with the shared experiences of other MOOC participants.

In addition, advanced level learning activities are offered to stimulate professionals of higher expertise levels or those who can afford spending more time on learning, to study. Advanced level activities can be optional. All learning activities are offered in an online learning environment providing affordances for the interaction and knowledge sharing.

As an alternative for individualized teacher feedback on performance and progress, participants are invited to generate ideas, challenges or questions for the experts and share their ideas or challenges in the environment so that experts and tutors can respond in a one-to-many way either through online video broadcasts or through blogs and online discussions.

These design principles have been put into practice in various non-formal learning opportunities, such as master classes and MOOCs offered by the Open University of the Netherlands (Firssova, Brouns, & Kalz, 2016; Kalz & Specht, 2013). The design principles have been piloted in MOOCs in the EMMA project and can be extended to different MOOC contexts.

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A social and inclusive approach

The ECO project is developing an architecture integrating several different MOOC platforms to provide ubiquitous access to MOOCs. One of the first actions was to develop a pedagogical framework for MOOCs that aligns with the European take on educational design classified as sMOOCs. sMOOCs are "social" since they provide a learning experience marked by social interactions and participation, and "seamless", since ideally they should be accessible from different platforms and through mobile devices and integrate with participants' real life experiences through contextualisation of content via mobile apps and gamifications.

By intention the pedagogical framework has been developed as a framework and not as a model because it needs to allow flexibility in approach and cater for the various needs of the learners. In particular, the learner is put central and the MOOC design should allow learners to learn by doing, learn through performing activities in a situated context, in interaction with content and other learners. Flexibility allows learners to choose their own learning path. The pedagogical approach is based on constructivist and connectivist learning principals, situated learning, and learning enhanced through gamification and mobile learning approaches (Brouns et al., in press).

Learning analytics

There is not, yet, a single definition of learning analytics. The first international Conference on Learning Analytics and Knowledge 2011 (https://tekri.athabascau.ca/analytics/) defined learning analytics as "The measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs". This definition already hints at supporting the learning process, although still a teaching perspective.

Learning analytics should be providing support to the learning process and there should not only be gathering data, but also define suitable metrics that allow interventions to take place (Clow, 2013). Often indicators and metrics rely on measures of activity levels (i.e. frequency) that do not allow meaningful interpretation unless these are related to the learning design and learning theory (Gašević, Dawson, & Siemens, 2015). Indicators are often used as predictors of learning success and visualised in learning analytics dashboards. When the indicators are not followed up by correct interventions, either by the learner or the teacher, the learning analytics fails in supporting the learning process. Therefore not only the quality of the visualisations is very important; the visualisations should be intuitive and easily understandable, learners and teachers should be able to extract relevant information and be guided in the interpretation of this information in relation of their learning process. Furthermore, it is important that a correct interpretation is followed by suitable actions and interventions (Gašević et al., 2015; Verbert et al., 2014).

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Challenges for learning analytics in MOOCs

The *open* dimension of MOOCs often means that there is no information about the background of the learners, or their learning objectives, making it difficult to measure learning progress. While the constraints in formal education are clearer, in MOOCs learners determine the learning opportunities on their own. Learning analytics has to focus much more on determining and supporting the on-going learning processes. The role of learning analytics should then be much more in raising awareness of these processes, assisting in reflection and monitoring of the progress and motivating to take the correct action, both for learners and teachers.

In a MOOC the role of a teacher is much more that of monitoring instead of offering direct and personalised instruction and feedback. Course designer and teacher rely on other forms of feedback, usually based on one-to-many feedback mechanisms or they have to rely on learners helping each other. Learning analytics should assist in tracking and visualising this process to allow the teacher and learner to assess the effectiveness of the process and signal specific situations that require (teacher) intervention.

Aligning learning analytics with MOOC design

Learning analytics approach realized in the EMMA MOOC platform illustrates both the possibilities and the caveats of using learning analytics when the integration with design is limited.

The EMMA platform provides learning analytics dashboards to both MOOC teachers and learners. Learner dashboards inform the learners on their progress in the MOOC that they follow, visualizing the proportion of lessons completed and /or learning activities undertaken by the learner, as well as the numbers of assignments and quizzes completed successfully, materials read or downloaded. EMMA MOOCs do not have to conform to a particular pedagogical approach or instructional design. However, the EMMA platform sets a fixed course structure, consisting of lessons, units and assignments. Therefore progress can be indicated along that course structure. The learning analytics approach in EMMA is only at high level linked to learning theories, in that it does assumes learning requires interaction with content and others. Therefore, in addition to analysing frequency of interactions, sequences and patterns of interactions are considered. By interacting with others, learners demonstrate uptake of knowledge and learning (Stahl, 2006; Suthers, Dwyer, Medina, & Vatrapu, 2010) and this is in EMMA operationalised by the conversations and blogs. Social and artefact networks illustrate how learning material is being used and what networks evolve around them (Tammets & Brouns, 2014). Furthermore, the dashboard allows an individual learner to compare his or her progress to that of fellow learners. Figure 1 is an exemplary representation of the learner dashboard in an EMMA MOOC.

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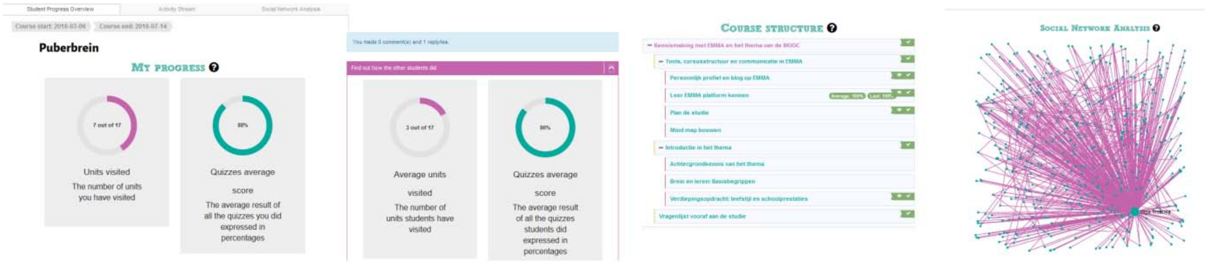

Figure 1. Part of an exemplary representation of a learner dashboard in EMMA

Learner dashboards realized in EMMA are not integrated in the instructional design, other than providing a general course overview. If such integration took place, learners' decisions what lesson to follow could be influenced by overviews of behaviour of others as can be seen in learning networks when learners determine the most successful learning route by looking at routes taken by others (Tattersall et al., 2008). Similarly, overviews of tasks that attracted others or were avoided by them could have helped learners to make conscious choices.

For teachers aggregated views are presented to give teachers a quick overview on learning activities accessed and assignments submitted. Time on task is often considered to be a measure of learning and the teacher learning analytics dashboard provides an indication of time spent and number of interactions in each of the lessons (see Figure 2 for an example of a teacher dashboard).

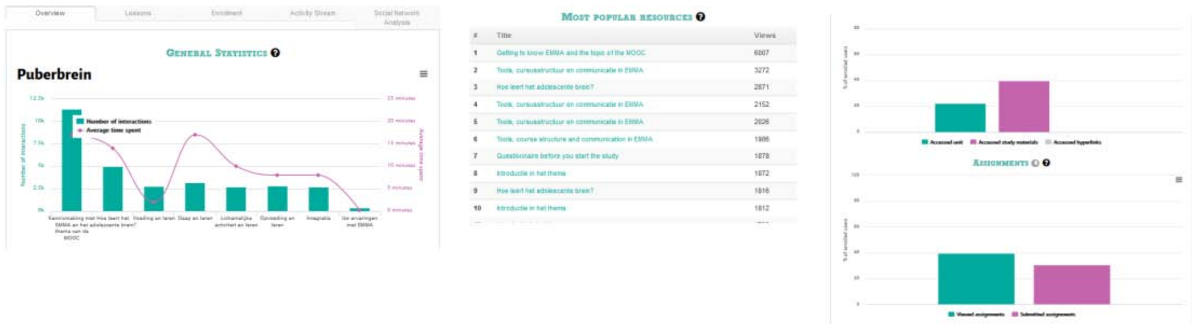

Figure 2. Exemplary representation of the teacher dashboard in EMMA

Contrary to EMMA, ECO sMOOCs adhere to a pedagogical framework of social, seamless inclusive MOOCs based on constructivist and connectivist principles. The pedagogical approach supports independent learning and is learner-centred. Through interaction with others and with content learners re-appropriate and recreate content, produce their own content, establish interconnections and interpersonal relationships, get and receive feedback, experience different perspectives and engage in the dialogue with others, which fosters real individual knowledge acquisition but also a shared construction of knowledge in a social context.

To this purpose, the metrics in learning analytics are connected to the goals of the learning activities. Learners are expected to stand still and understand the purpose of the learning activities, the characteristics of what the course designer or teacher expected in relation to their participation in the proposed activities, and how learning analytics provided serve as a

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representation of this. Thus, learners are encouraged to set personal goals for their participation and to use the analytics to help monitor these. One of the key attractions of learning analytics in ECO is the possibility to support the learner in actively reflecting on and taking action to manage their learning process.

However, the implementation of suitable learning analytics is quite complex. The pedagogical approach is flexible, but can also be implemented in many various ways. Therefore there is not a fixed course structure and every course could be designed differently. Furthermore, ECO aggregates multiple MOOC platforms and each of these platforms provides different mechanisms to implement the pedagogical approach, complicating learning analytics even further. Solutions need to be found to inform the learning analytics not only of course structure but also of course and pedagogical design.

Research indicates that MOOCs have different categories of learners, ranging from those who browse a little to those intending to do the complete course aiming for a full certificate. These categories of learners differ in their level of engagement with the course materials and learning activities to meet their personal learning goal. Learning analytics should take that into account and support the learning goal of that particular category.

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CHANGING LANDSCAPE OF THE LIFELONG LEARNING INNOVATION IN EUROPE

András Szűcs, EDEN and Center for Learning Innovation and Adult Learning, Budapest University of Technology and Economics, Hungary

Policy background

The middle of the second decade of the 2000s in the European Union scene may be characterised by cumulated economic, social and policy problems, uncertainty, slowing down in development. Superposed on this, have emerged the structural and power relation troubles of the EU institutions appearing after the 2014 EU Parliament elections, the linked usual changes in the policy machinery, not to mention the medium-term planning and budgeting processes for 2014-2020.

The increasing public interest towards education in particular has generated many reflections in the media, studies, forecasts and speculations and contributed to the creation of an atmosphere of expectations, together with dissatisfaction because of the failure of the majority of ET2010 targets and the long tail of the 2008 economic crisis.

An exemplary resource of recent atmosphere of disappointment has been the Erasmus+ new educational program implemented with many mistakes. With the decentralisation of the implementation to the National Agencies from EACEA has been a rapid failure. The combination of different interpretation of the rules and different technical approaches lead to divergences from one NA to another, resulting a strong feeling of injustice.

The new resource model of the projects, with the underfinanced pro rata scheme (in particular in the most popular action) has rearranged the potential participants' spectrum, displacing the smaller institutions like associations, foundations, smaller companies (cf. European Parliament, 2016). Weakening the civil society and professional organizations may be in consonance with the strategic message which gives unquestionable priority to economic growth and employment. Regrettably, the European added value of projects is not considered to be as important anymore as National Agencies favour national priorities.

Another not properly prepared and scheduled action is considered the Opening up education initiative (2014), misplacing the strategically important field of open and ICT enhanced learning. The European Commission's decision to move adult learning from DG Education and Culture to DG Employment raises questions about the Commission's commitment to lifelong learning (EAEA, 2014).

In the meantime, with the escalation of the migrants' problem, the role of civil organizations may be higher valued (Policy Networks, 2016).

The recent Skills Agenda for Europe initiative (2016) as a potentially progressive action line by the Commission, aims to boost employability, competitiveness and growth in the EU, to improve the quality and relevance of skills formation, to make skills and qualifications more visible and comparable. Concrete measures in support the implementation of the Agenda include a review of the Recommendation on Key Competences, an initiative on graduate tracking, a review of the European Qualifications Framework. The Digital Skills and Jobs Coalition is a flagship initiative among a number of other initiatives that were presented.

The relation of education and training with the social usefulness has been reconsidered in these years. Business models are changing, new stakeholder alliances emerge, supported by fresh social and economic demands and clusters of interests. In the education – employment context, enhancing education providers' job placement awareness, efforts for exit strategies from universities is emphasized, together with the request to follow closely how training is translated into employment.

Lately however, EU Commission President Juncker made his annual State of the Union speech. It was received with disappointment that a continued low priority for research and higher education from the side of the Commission (EUA September 2016). President Juncker did not once mention research, innovation or higher education. Instead it was proposed to enlarge and prolong the European Fund for Strategic Investment (EFSI), which has clearly failed to fund innovative projects or bring universities and industry closer together, as originally promised (EUA June 2016).

Paradigm change quest in lifelong learning: towards stability in complexity

In the multifaceted settings outlined above ("… Complexity is the new reality…" – Conole, 2012) the relevance of a holistic attitude is increasingly stressed, directing the focus on comprehensive approach of learning scenarios and environments (EDEN, 2015, 2016).

Increasing attention is being devoted to the relationships between learning, living, and society, and to learning communities which extend beyond education, including the way learning is organized in different communities and spaces (intergenerational and cross-cultural, learning).

Whilst however, these factors would act towards the extension of contexts of learning, including employability, quality of life, joy of learning, learning experience etc., the integrating approach of Lifelong Learning on its own right receives surprisingly small attention in the EU policies. A kind of contradiction is that the LLL field seems to be de-valuated, losing impact and voice in the policy and social debates.

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Uncertainty can be experienced in the priorities, policy actions and implementation pathways on national (member state) levels as well showing conceptual and even terminology confusions, leading to loss of strategic momentum and misplacement of this important terrain.

In the recent years, we are at a *meta-stable point* of the development-change curve. Lifelong learning is meanwhile considered to be one of the areas where EU cooperation showed the greatest added value (EUCIS, 2014). It is a structuring element for competitive knowledge societies but also for personal fulfilment and well-being, social cohesion and active citizenship. Lifelong learning is creating a sense of self-worth and self-confidence in EU citizens, enhancing their position and acceptance in society.

Implementing the related strategies requires working in partnership across sectors. Reforms should adopt a life-wide approach to learning where all its kinds – formal, non-formal, informal – are recognised as genuine paths to gain competences and access qualifications. A recurrent but unavoidable quest is that education should be more open and relevant to the outside world, which includes the labour market as well as civil society and communities (EUCIS, 2012).

Remarkable efforts come into sight nowadays to initiate a renaissance of broad and inclusive interpretation of lifelong and lifewide learning in systems thinking. Coherent and comprehensive lifelong learning strategies are needed to modernise education and training systems and ensure individualised pathways for learners.

Building on the above, new horizons and a holistic vision of the learner and broader objectives for lifelong learning are desirable, to ensure the systemic impact which makes real a cross-sectorial partnership approach with civil society and key stakeholders for better multilevel governance. This also would mean formalising the structured dialogue and consultation mechanisms (EUCIS, 2012; Kálmán, 2016).

It is timely to look at Lifelong Learning as paradigm change element in education and through better understanding and assessment of current practices to explore strategies for addressing unmet needs.

Notwithstanding, paradigm shift requests have often been used as rhetoric tool but in times of strategic importance, recognizing the relevance of their smart use is indispensable. Kuhn envisioned a science as having, at any one time, a world view, or *paradigm*, of its environment. Society meanwhile needs quite a bit of stability. You should not abandon a paradigm until you have one to put in its place, because our paradigm is that which allows us to function (Kálmán, 2016).

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Digital pedagogy

In the past decade, the environment of education has changed quickly, with astonishing developments in the macro-factors of technology, globalization, and demography. For a long while, education has mostly been following the *content delivery and assessment* model, with the main goal being the transmission of knowledge. In the digital age, technology is putting more and more tools in the learners' hands and education is becoming a service focusing on the learner, providing much more freedom than earlier.

Rapid spread of cutting-edge technologies, resulted spectacular increase in demand for them and in their use. The changing notion of access, accompanied by the increasing volume and improving quality of digital content, and the radically transforming habits and expectations of users have engendered new interpretations concerning several related concepts and have repositioned the social impact of ICTs in learning.

New stakeholder alliances emerged, supported by fresh social and economic demands and clusters of interests. Open access movement, revolutionary settings like MOOCs, atypical learning solutions are active in transforming the scene.

The changes in the information society in the learning field have been happening meanwhile largely outside the institutional settings and often along unexpected pathways. This was often accompanied by contradictions and provisionality.

Among the pedagogic challenges raised by the social web, the issue of advanced online course development, spontaneous knowledge management, is emerging. Tools are better affordable, access to networks easy, social media spontaneously expanding and producing by the users creative scenarios relying on the expanding power of networking. Students often use the social web very creatively and they build up wikis to replace LMS quickly. The digital modernization is actually just happening, progressing in the environment of the learners who are always ahead.

According to Siemens (2013), the massive recent and cumulated achievements of research in online and distance education have mostly been ignored. Paying attention to what is already known about learning in online and virtual spaces, to how the role of educators and learners is transformed and how social networks extend a learning network may enable mainstream MOOC providers to make evidence-based decisions in favour of educational reform.

A potential example of breakthrough

A possible way forward, combining the latest achievements of the digital learning – social media – massification – changing *granularity* of the learning elements can be illustrated by the recent EdX (non-profit online learning destination founded by Harvard and MIT) initiative. *MicroMasters* offers promising example how a structurally innovative and disruptive initiative may change the system. The program offered by a group of reputable universities represents a new category of Master's level online education to bridge the knowledge gap between higher education and the workplace. The MicroMasters certificate as standalone credential is

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comparable to a portion – a quarter or a half – of a traditional Master's grade and offers a new path to an accelerated graduate degree. Successful MicroMasters learners may apply to a full Master's program with the digital credential counting as credit toward the degree.

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ELENE4WORK – DEVELOPING A FRAMEWORK FOR SOFT SKILLS AND DIGITAL SOFT SKILLS FOR EMPLOYABILITY

Deborah Arnold, AUNEGE-Université de Bourgogne, France, Maria Cinque, EUCA, Belgium, Teresa Guasch, Barbara Garreta, Anna Espasa, UOC, Spain, Andrzej Wodecki, Magdalena Jasinska, UMCS, Poland

Introduction

The ERASMUS+ funded eLene4work project (http://elene4work.eu) helps students develop the soft skills mostly required by companies and will help companies exploit the digital talents of new employers and young workers. eLene4work proposes a strategic partnership among universities whose goal is to test and monitor the possibility offered by MOOCs (Massive online courses) and OERs (Open Educational Resources) to fill the gaps between the university and the labour market. Our goal is to help the companies identify the digital skills that would be of value to their business, taking into account a sample of pre-selected key digital skills, i.e. the soft skills developed by digital activities such as e-collaboration, digital communication, social network participation, social media management and web 2.0 activities in general.

The aim of the eLene4work project is to enable students to develop autonomy in identifying their own gaps in soft skills and competences, in order to develop or improve them and their potential in digital soft skills, thus helping them in their entry to the labour market. Also, students should autonomously learn how to fill their skills gap using MOOCs (and OERs) and to include their soft skills and their digital soft skills in their CV in order to enhance their employability. The final outcomes of the project will also contribute to the development of the labour market through the exploitation and the added value of the creative potential of students/new workers in terms of digital competences.

This paper describes the pathway we created to help students develop soft skills and digital soft skills, taking into account the framework that emerged from the first two outputs of the project (comparative analysis and focus groups) and its application in three main concrete outputs of the project: a self-assessment tool for students and young workers, an orientation guide and a personal journal. The pathway will be tested during the field evaluation phase from September 2016 to August 2017.

Comparative analysis

The first stage in the project was to carry out a comparative analysis. This is a cross-institutional analysis focusing on the identification of the most important soft skills needed for successful transition from university education to the labour market, compiling and comparing studies, initiatives and practices in each partner country on the following topics:

- soft skills gap in students approaching the labour market;
- digital soft skills (soft skills 2.0) in students, new workers and young people in general.

This document provides a clear overview of the state of art of each country involved and set an important milestone for the partnership, in order to find a common point of view as a base to start the activities of the project. Furthermore, it includes a comprehensive review of current literature on employability skills and surveys by government, non-profit, and industry-affiliated organisations from Europe and third countries, identifying the range of soft skills relevant for new graduates. We take into account multiple perspectives of scholars, researchers, experts in human resources, employers and educators/teachers, in order to compare and contrast different views/perceptions on the subject, identify misconceptions and rank priorities for soft skills development.

The report hopes to enhance understanding of which soft skills are the most important for today's new employees and indicate key areas for soft skill development at University level.

The document also highlights the innovative experiences carried out in the different countries to contribute to developing knowledge on European best practices.

The report covers:

- the adoption of studies focused on transversal skills and soft skills 2.0 the project (literature exchange);
- the definition of soft skills and digital soft skills (on the base of the choice done, a common eLene4work definition of soft and digital skill will be given, using the same glossary and standard of classification)
- a comparative analysis on what happens in each countries (for example if the soft skill gap in young people approaching the labour market regards the same skills or if there are differences influenced by the different cultures);
- the initiatives carried out in the country partners to 'fill this gap' (best practices research);
- the supportive services that have been developed and how are these local initiatives are recognised by the labour market in terms of quality.

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Defining soft skills

One issue we would like to stress is that our approach about the *skill concept* is based on a contextualised competence. That is, we understand that the skill has sense within a specific context, situated in a specific context with specific characteristic (Guash, Alvarez, & Espasa, 2010).

It is necessary to frame the scope of our investigation and to better define what we mean with the term soft skills. Life skills, social skills, interpersonal skills, leadership skills, transversal competences, social competences, and meta-competences, are commonly used to refer to the "emotional side" of human beings in opposition to the IQ (Intelligent Quotient) component related to hard skills (Shalini, 2013).

According to Heckman and Kautz (2012) "soft skills [are] personality traits, goals, motivations, and preferences that are valued in the labour market, in school, and in many other domains […]". They are "a mix of dispositions, understandings, attributes and practices" (Yorke, 2006).

Knight and Page (2007) define them as wicked competences, as it is very difficult to define them, because they can assume different forms in different contexts and they keep developing along the entire lifetime (Ciappei & Cinque, 2014).

A working definition we propose for this article, it is taken from Haselberger and other authors within the ModEs project (Haselberger et al., 2012; Cinque, 2012):

> *"Soft Skills represent a dynamic combination of cognitive and meta-cognitive skills, interpersonal, intellectual and practical skills. Soft skills help people to adapt and behave positively so that they can deal effectively with the challenges of their professional and everyday life".*

We must also observe that the terms *skill*, *competence* and *competency* are often used interchangeably, but they are not necessarily synonymous. Competencies may refer to sets of skills, but *competency* is more of an umbrella term that also includes behaviours and knowledge, whereas skills are specific learned activities that may be part of a broader context. In particular, *competence* represents a dynamic combination of knowledge, understanding, skills and abilities (Tuning Project, 2000). Competence can also be defined as a strategic behaviour, linked to the possibility of adjusting performance to the demands from the context (Guasch, Alvarez, & Espasa, 2010). *Competency* is also used as a more general description of the requirements of human beings in organizations and communities. Skill often refers to specific learned activities that may be part of a broader context.

The definition of *digital soft skills* or *soft soft 2.0* requires the understanding of the *wider* framework of digital competence.

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Digital competence is recognised as one of the eight key competences for lifelong learning by the European Union, summarized as "involving the confident and critical use of Information Society Technology (IST) for work, leisure and communication" (EU, 2006). As Ala-Mutka (2011) points out there are many definitions of Digital Competence and there are many overlapping concepts, such as digital literacy, ICT literacy, media literacy etc. Digital competence is a transversal key competence that enables acquiring other key competences (e.g. linguistics, mathematical competence, learning to learn, cultural awareness). It is related to many of the so-called 21st century skills which should be acquired by all citizens, in order to ensure their active participation in society and the economy.

Comparative analysis in 9 member states and at EU level covered reports, articles, rest practices, projects, policies and supportive services, resulting in the study of 165 sources. The full results can be found in the report Comparative analysis on the state of the art of soft skills and soft skills 2.0 http://elene4work.eu/project-outputs/comparative-analysis/

Focus groups

The second phase in the definition of soft skills and the identification of the skills gap consisted in running focus groups carried out in 9 partner countries: Belgium, Finland, France, Germany, Greece, Italy, Poland, Spain, UK. The aim of the Focus Groups meetings was to find out what we mean by *soft skills*, whether they are recognised in partner countries and to check which soft skills are really important and needed in labour market, in which areas students and young workers have biggest gaps and what should be done to change this situation.

Focus Group meetings were organised with 2 stakeholders groups:

1. students (especially closed to graduation) and young workers (FG1);
2. employers, HR managers, teachers (FG2).

In each partner country, the same set of questions was used during meetings to make it possible to compare results and situation in all countries. In the report (http://elene4work.eu/project-outputs/focus-groups/) we present the results of meetings with both groups and general conclusions.

To help students to autonomously identify their own gaps in soft skills we need first to know what we mean by "soft skills" and if they are recognized in partner countries (and it was the aim of Output 1 to analyse state of the art of soft skills and soft skills 2.0) and to check which soft skills are really important and needed in labour market, in which areas students and young workers have biggest gaps and what should be done to change this situation. And it was the aim of Focus Groups meeting to investigate with stakeholders this subject. Results from this report will be used to develop *self-evaluation questionnaire* (O3) and then *orientation tool for students and young workers* (O4).

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For each target group focus groups were organised in two rounds. The general aim of the research was to gather information about missing soft skills in the labour market, skills 2.0 and existing potential in students close to graduation or young workers.

During the first focus group meeting with students and young workers (FG1), the following questions were asked:

- In your opinion, what are the most important skills required by your future employers?
- Have you ever heard the expression *soft skills*? Which of just listed sills are in your opinion *soft skills*? How would you define them? How important, in your opinion, they are?
- What are the most important soft skills in the labour market? (identify 2-3)
- What soft skills, and how, you can develop before entering labour market?
- Which soft skills are or can be improved by using web 2.0 activities in general?
- How do you imagine the workplace of the future?

During first focus group meeting with second focus group (FG2), the following questions were asked:

- When you hire a new employee, what are the most important skills, factors you take into account?
- What does the expression *soft skills* mean to you?
- During the recruitment, what are the gaps between your expectations and the soft skills of the interviewees? In which skills you observe largest gaps?
- Does your company invest money in training of soft skills?
- In your opinion, what can the youngsters/students/young workers bring to the company in terms of digital skills?
- In your opinion, what are the most important soft skills needed by young people to enter successfully in the labour market? What would you recommend to students entering job market?
- Which soft skills do you think your students have? Which soft skills do you think your students should develop/enhance?
- What are possibilities to develop soft skills during studies?

The second meeting in both groups was to share and discuss results of the first meeting of the opposite group (Impressions from the results about soft skills from FG1 and FG2). This means that students and young workers discussed the main findings from first meeting of employers and HE teachers, and employers and HE teachers discussed the findings from the first meeting with students and young workers.

Participants of FG meetings listed a lot of soft skills which are needed on labour market. The most popular mentioned in most counties are social skills connected with working in groups, communication, openness etc.

All mentioned soft skills which students should develop before entering labour market we can divide in to 5 groups: social skills, self-skills, personal skills work skills, digital skills.

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Business representatives and HE teachers pointed out a lot of gaps concerning soft skills in students. The most important of them we could divide into 4 groups:

1. social skills: teamwork, communication (online but also face-to-face "traditional" communication; all levels: speaking, listening, formal and informal writing), flexibility, openness for constructive feedback and humility (in social contacts students are too self-confident and convinced they know everything);
2. personal skills: empathy (and other competences appropriate for emotional intelligence), honesty, commitment and motivation, openness for new things to learn, curiosity, patience, perseverance, capacity to learn from one's failure;
3. *self-skills*: self-evaluation, self-regulation of the learning process and, as a consequence, capacity to make a conscious career choice;
4. learning skills: synthesis, skills of numeracy, ability to absorb in and deeply familiarize the topic, presentation skills.

The soft skills framework

Based on the outcomes of both the comparative analysis and the focus groups, we created a table summarising the main soft skills and digital soft skills to include in the framework. During this process, it emerged that digital soft skills were clearly lacking, in particular from the focus groups, where the concept was not dealt with in sufficient detail, partly due to lack of time, but also due to a weaker understanding of digital soft skills on the part of students but also of employers. Further research was undertaken and discussions initiated with the Institute for Prospective Technological Studies (IPTS) around the DIGCOMP framework (https://ec.europa.eu/jrc/en/digcomp). This enabled us to select the digital competencies in line with our own definition for inclusion in the eLene4work framework, benefitting from and aligning with work already done at EU level.

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The end result is thus the following soft skills framework:

Table 1: eLene4work soft skills framework

Soft skills framework	
Social (inter-personal)	Communication Teamwork Conflict management Negotiation
Personal (intra-personal)	Leadership Self-evaluation Adaptability and flexibility
Methodolological	Learning to learn Analytical skills Creativity and innovation Problem solving
Digital (from DIGCOMP)	Information and data-processing (Digital) communication (Digital) content creation (Digital) problem solving

Exploiting the soft skills framework in the next steps

This framework has been applied in the following three concrete outputs of the eLene4work project:

1. *A self-evaluation tool* assessing students' soft skills and digital soft skills for helping to identify the needs for improvement, which was developed by taking into account, for each skill, definitions, skill dimensions and learning outcomes from a previous project (the already mentioned ModEs project) and selecting the most suitable questions from pre-existing questionnaires and tools used for soft skill self-assessment and self-evaluation.
2. *An orientation guide* specifically designed for students and young workers, to help them in their approach to personal development in soft skills and digital soft skills and covering:
   - the transversal skills required by the international labour market useful for mobility in European Countries;
   - new ways of learning (the main differences in studying online compared to face to face);
   - the potential of MOOCs: information about their classification, how they are organised, how to participate etc.;
   - how to optimise participation in MOOCs, to get the best out of this experience;
   - what they need to know, and the learning-to-learn competences they need, to undertake this experience;

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   – which obstacles may occur during these courses and how to overcome them.

3. *A personal journal* which supports the students learning process while learning with MOOCs and helps students to reflect on their learning and record personal insights and reflections on their experience. The personal journal is the assessment tool not only for the students themselves, but also for the monitoring team of the project that follows the students' progresses. It is used to assess activities like motivation of students during the course lifecycle, level of attendance and participation to all the activities proposed, quality of programmes and contents in general as well as the cultural approach in teaching and learning models. Standardised structures and workflows are planned to allow a common evaluation approach between the institutions and countries involved.

These three outputs will be applied in the field evaluation phase from September 2016 to August 2017, during which student experiences will be monitored through the Personal Journals. Besides monitoring the training experiences, student feedback and evaluation will be collected – during the training – in a variety of ways, including formal and informal, quantitative and qualitative data gathering. Furthermore, some students will be required to write their own story, i.e. a detailed analysis of all the individual experiences during the training phase (digital storytelling). In the final phase of the project, students will be administered the soft skill assessment questionnaire again in order to measure the "improvement" obtained thanks to the training by MOOCs. It will be a subjective measure (self-assessment) and a formative assessment, rather than a summative assessment, since our goal is to identify student perceptions of their growth and, eventually, further potential for improvement. In some cases students will be required to do a practical test (for example problem solving, in prompt speech on a given subject, etc.) in order to demonstrate the efficacy of the training for skill development.

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Collection of "Synergy" Synopses

Thematic focus and relevance of the Synergy initiatives

Acronym	CARE	COOP	GUID	INNO	MLS	NETW	QFIC	RISK	SCL	STRU	SVET	WBCD
I-LINC						X						
LoCoMoTion				X					X		X	
EuroDuaLE		X										
tMAIL								X		X		
eLene4work	X		X				X					
ARMAZEG	X							X				
LeHo				X	X			X		X		
SeaL							X					X

Conference themes and their related tags

CARE	Building ICT competencies for carers
COOP	Enterprise-education (Academia, VET) co-operation
GUID	Student guidance services and their effectiveness at universities
INNO	Innovation in e-learning business models, management processes
MLS	Mobile learning solutions at the workplace
NETW	Working and learning in networks, communities of practice, social media – social interactions in workplace based e-learning
QFIC	Qualification, competence validation and recognition issues
RISK	ICT-enhanced teaching/training of excluded or at-risk groups
SCL	Scaling up work based learning by ICTs
STRU	Distance and e-learning and the restructuring of educational levels - vocational, post-secondary, and higher education
SVET	E-learning solutions for vocational education and training
WBCD	Measuring competence development in work based learning

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NETW

I-LINC

The stakeholders' platform on digital inclusion and skills opportunities to boost youth employment and entrepreneurship in Europe

Website: http://www.i-linc.eu

Runtime: 01.2015 – 12.2017

Supported / co-funded by: Horizon2020 / Grant Agreement No. 645909

Partners: Telecentre Europe, Belgium; Technische Universität Dortmund, Germany; Telefónica Europe, Spain; European Schoolnet, Belgium.

Project representative to be contacted for further info: Jens Maylandt, Technische Universität Dortmund, Sozialforschungsstelle (maylandt@sfs-dortmund.de)

The aim of I-LINC project is to bring together European stakeholders in the fields of ICT for learning and inclusion with regard to youth employability and entrepreneurship in order to support their impact and reach. The project will create an overarching meta-platform thriving to attract stakeholders from the named thematic fields. Therefore, the project identified existing communities, networks and platforms addressing experts in those thematic fields.

Main target groups of the project:

Stakeholders and experts in the fields of ICT for learning and inclusion with regard to youth employability and entrepreneurship

Significant public results:

Main result is the creation of a meta-community, based on an online platform: http://www.i-linc.eu

Further results comprise – among others:

1. a survey of existing platforms
2. several databases for best practices, policies, stakeholders, events and learning opportunities
3. Learning events (online and offline)

INNO SCL SVET

LoCoMoTion

The development and dissemination of methodologies for Low-Cost Mooc producTion and delivery

Website: https://moocs4all.eu

Runtime: 02.2015 – 01.2017

Supported / co-funded by: Erasmus+ KA2 Cooperation and Innovation for Good Practices

Partners: Institute of Technology Sligo, Ireland; Delft University of Technology, Netherlands; Fachhochschule Bielefeld, Germany; Universitat de Girona, Spain; Bath Spa University, United Kingdom.

Project representative to be contacted for further info: Brian Mulligan (mulligan.brian@itsligo.ie)

The LoCoMoTion project aims at increasing the supply of free online education in Europe by collecting and spreading knowledge on low-cost techniques and technology for the development, production, accreditation, delivery, assessment, and evaluation of Massive Open Online Courses (MOOCs). Common approaches tend to be overly expensive and/or time-consuming for smaller institutions and companies, and even more so for individual lecturers. In addition, languages spoken more rarely and specialized subjects are less to be found in the realm of regular, expensive MOOCs. LoCoMoTion attempts to make MOOCs accessible as a medium for all who want to teach and at the same time to enhance the breadth of the courses that are available to all who want to learn.

Main target groups of the project: LoCoMoTion's target groups are institutions and individuals who are interested in developing MOOCs but who feel they do not have the resources for doing so. Ultimately, this initiative aims at supporting anyone who has difficulty accessing educational opportunities.

Significant public results: The most prominent aspect of LoCoMoTion is the open online course called "moocs4all – Making MOOCs on a Budget" developed by the partners and delivered in a number of continuously improved versions. This course teaches its participants about lean approaches to aspects so diverse as, for instance, production management, video editing, and measures to enhance retention. The first (beta) run and the second run were delivered on the edX Edge platform, each run taking five weeks. The first run started June 23, 2015, the second run May 17, 2016. A third delivery is scheduled to run for six weeks starting October 18, 2016 on the Canvas.net platform.

The LoCoMoTion partners do not only conduct their own experiments on lean production but also collect promising approaches by others and make this information available through link lists. Further dissemination activities so far include presentations concerning the project approach and its results at eleven conferences (including giving a workshop at EDEN 2015 Barcelona) and in three webinars.

To examine the proposed approaches to lean production, the LoCoMoTion project produces further open online courses in addition to its central course "moocs4all", supports other MOOC makers, and evaluates the lessons learned by doing so. These courses have been and are being developed in several languages on a broad range of topics from wind energy to man-machine interaction. The LoCoMoTion partners are happy to work with further potential MOOC makers on the implementation of low-cost approaches.

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COOP

EuroDuaLE

European cooperative framework for Dual LEarning

Runtime: 09/2015 – 08/2018

Partners: Università degli studi di Modena Reggio Emilia, Associazione Sophia R&I, Fondazione ADAPT, Camera di Commercio Italo-tedesca AHK, Otto-Von-Guericke-Universitaet Magdeburg, University of Southampton, Fondazione Politecnico di Milano, UC Leuven, Cofora International Projects, EFE, Universidad de Sevilla, Università degli Studi di Padova, Università degli Studi Roma TRE.

Project representative to be contacted for further info: Antonella Poce (antonella.poce@uniroma3.it)

EuroDuaLE Erasmus+ project want to open the road for transnational cooperation for the provision of dual learning programmes. HEI are asked to strengthen the quality of the education provided, for example with the use of ICT solutions and more innovative training approaches, open up to cross-national cooperation and relate more efficiently with the labour market (EU Modernisation Agenda for HE, 2011). EuroDuaLE project aim to put HEI at the centre of a new learning/training framework, a new form of transnational dual learning driven by HEI which promotes formal learning combined with apprenticeship possibilities and work-based learning, as an approach to accompany European youth in their mobility experience. The framework implies form of physical mobility and virtual mobility, reducing the social costs of migration by using the potential of ICT solutions.

The European Commission has clearly stated in the 2020 Strategy the will for a smart, sustainable and inclusive growth, increasing significantly the investments for higher education, research and innovation. Europe increasingly need people with the right combination of transversal competences, digital skills, creativity and adaptability, together with solid technical knowledge depending on the specific field. Higher education programmes are too often behind compared to the emerging needs of the economy in general, and specifically to emerging career paths. High youth unemployment, even among highly skilled young adults, is the result of such delay, particularly dramatic in southern Europe.

To facilitate youth integration in the labour market and stimulate job creation, and actual placement, there is need to close the gap between labour demands and people actual training and competences. In this context, Dual Learning Systems seem to have the potential to substantially increase the employability of young people at the end of the educational experience.

The project as a whole is therefore innovative in several ways:

- propose a dual learning system applied to Higher Education, while nowadays mostly carried out by VET institutions.
- emphasize the international dimension of HEIs and apprenticeship
- introduce some form of informal learning on-the-job which combined with formal learning happening in HEIs gets official recognition and assessment by the HEIs
- propose a methodology as a reference for future planning at national and European level
- explore the support demand of young adults during their mobility experience and job-related migrations

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- analyse and explore national and European regulatory frameworks for the implementation of a transnational dual scheme

Main target groups of the project: 300 participants. The target groups for the project comprehend: HEIs staff, HE students, employers, representatives of VET providers, representatives of European DGs and association in the field of VET and HE, policy-makers at national and regional level, representatives of career centres and employment services, chambers of commerce, student associations, experts of quality assurance and global networks.

Significant public results: In details:

- 7 Intellectual Outpus and 3 reports about Labour Demand analysis and mapping of youth mobility in Europe, Analysis of existing dual learning programmes as drivers for employability.
- a joint staff event will involve 7 HE staff and 7 employers/training providers. A training day is foreseen in order to present them the EuroDuaLE framework, discuss the operational details for the implementation of the model and the implications of the model for HEIs and employers/training providers.
- a blended mobility experience for HE students will involve 36 students selected from the Universities. The mobility activities are meant to pilot the EuroDuaLE framework, giving students the opportunity to do e-learning and later a workbased learning period in another country, supported by the HEIs involved.
- two multiplier events to present the intellectual outputs produced to key stakeholders and collect decisive feedbacks (some aspects may be underestimated or not included in the analysis).
- a Roundtable where targeted experts and stakeholders will discuss the framework designed, identify strenghts and shortcomings, propose indication for a revision of the framework. These stakeholders will be also demanded to act as testimonials of the EuroDuaLE model within their organizations and contact networks.
- 5 national events to present the Handbook for dual learning mobility in each of the countries taking part to the piloting phase (ITALY; GERMANY; UK; BELGIUM; SPAIN).
- a closing event is foreseen where all participants in the project will be asked to join and share their experience with the EuroDuaLE curriculum and mobility activities (students, HEIs staff, employers/training providers). Also stakeholders will be invited to express their opinion on the cooperation framework developed and the potential transferability and adaptability of the model to different contexts and countries. Lastly, the event foresees the preparation of informative stands.

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RISK STRU

t-MAIL

Teacher Mobile Application for Innovative Learning

Website: http://tmailproject.eu

Runtime: November 2015 – October 2017

S**upported / co-funded by**: Erasmus+ Programme, Support for policy reform; Prospective initiatives; Forward looking cooperation projects

Partners: VRIJE UNIVERSITEIT BRUSSEL, Belgium (Coordinator); UNIVERSIDAD AUTONOMA DE MADRID, Spain; UNIVERSITY OF HULL, UK; UNIVERSITAET WIEN, Austria; Youth Entrepreneurial Service Foundation, Former Yugoslav Republic of Macedonia; HET GEMEENSCHAPSONDERWIJS, Belgium; EUROPEAN DISTANCE AND E-LEARNING NETWORK LBG, UK; Kidimedia bvba, Belgium; ETUCE-CSEE, Belgium.

Project representative to be contacted for further info: Jeltsen Peeters (jeltsen.peeters@gmail.com) – project coordinator.

t-MAIL aims to develop and test a mobile application supporting primary school teachers, teacher educators and educational decision makers in implementing classroom practices that stimulate students' self-regulated learning (SRL). The project aims to address the needs of these different target groups by designing activities to support the development and testing of a mobile app. It delivers a personalized training course on SRL for in-service primary school teachers. Data generated through the mobile app will be processed through learning analytics and semantics. This approach, in support of data-driven teacher education, will enable the personalization of teachers' and students' learning, ultimately facilitating evidence-based policy making pathways. The mobile training app and associated feedback loops will be piloted and evaluated in three European countries, the UK, Belgium and Spain. Materials will be available in English, German, French, Spanish, Dutch, and Macedonian.

Main target groups of the project:

Primary school teachers

Teacher educators, trainers

Decision makers

Significant public results:

Expected project results

Deliverable	Expected time of delivery
Theoretical framework report	31 March 2016
Stakeholder study report	31 March 2016
Repository course material	31 March 2016
Country reports educational policy	31 March 2016
Algorithm	April, 2016 (draft) July, 2017 (final)
Mobile application	October, 2016 (draft) July, 2017
Data warehouse and learning analytics procedure	October, 2016 (draft) July, 2017 (final)

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RISK STRU

User manual learning analytics	October, 2016 (draft) July, 2017 (final)
Teacher training course	October, 2016 July, 2017
Implementation plan	December, 2016 (draft) July, 2017 (final)
Pilot study	31-Jul-2017
Evaluation plan	31-Oct-2016
Evaluation report	31-Jul-2017

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CARE GUID QFIC

eLene4work

Learning to learn for new digital soft skills for employability

Website: http://www.eLene4work.eu

Runtime: 12.2014 - 10.2017

Supported / co-funded by: Erasmus+ Cooperation for innovation and the exchange of good practices, Strategic Partnerships addressing more than one field

Partners: eLene4Work Coordinator: Fondazione Politecnico Di Milano, IT; see more at: http://elene4work.eu/project-description-2/list-of-partners/

Project representative to be contacted for further info: Project coordinator: Matteo Uggeri (info-eL4w@eden-online.org)

The aim of the eLene4work project is to help students and new entrepreneurs develop soft skills (often also referred to as 21st century skill, such as problem solving in a creative way, learning to learn, cooperation, effective and clear communication, adapting to different cultural contexts, managing conflicts, showing endurance in complicated or stressful situations, etc.) skills required by companies of all sizes nowadays. The eLene4work outputs and services, therefore, are also aimed to help companies exploit the digital talents of young employees. The project proposes a strategic partnership whose goal is to test and monitor the possibility offered by various means of open and distance learning opportunities such as MOOCs and OER to address the demand for digital soft skills (like e-collaboration, digital communication, social network participation, social media management and web 2.0 activities in general) formally not taught at universities but desirable by most employers on the labour market.

The aim of the eLene4work project is to allow students to:

- autonomously identify their own:
  - a) gaps in soft skills and competences, in order to develop or improve them;
  - b) potential in digital soft skills, to increase their professional attractiveness on the labour market;
- autonomously learn how to:
  - a) fill their skill gap using MOOCs (and other OERs)
  - b) include in their CV their soft skills and digital soft skills in order to enhance the opportunity to enter the labour market.

Students will learn to learn how to use and exploit their own digital competences and soft skills on the labour market.

Main target groups of the project: The various project outputs are being developed to bridge a clearly identifiable gap between what employers seek and job seekers can offer in terms of today's essential digital skills. From the educational point of view both VET institutions and universities (deans, presidents, rectors, teachers as well as students) can benefit from the eLene4work services, while on the other hand managers, HRs, entrepreneurs, chambers of commerce and company associations are also primary target stakeholders. The project's secondary target audiences include instructional designers, e-learning experts, researchers and policy makers.

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Significant public results: The main results of *eLene4work* will be the following:

Comparative analysis on state of the art on soft skills and soft skills 2.0:

This report provides a cross-institutional analysis focusing on the identification of the most important soft skills needed for successful transition from university education to the labour market. It is based on the partners experience in the field and puts together and compares all the studies, initiatives, practices emerging in each single country on the following topics:

1. soft skills gap in students approaching the labour market;
2. digital soft skills (soft skills 2.0) in students, new workers and youngsters in general. However, the information on digital soft skills is not explicitly mentioned in the analysis of every country, but in some cases it can be referred to more indirectly, as for example, when the document gives information on online training.

Focus groups with the stakeholders

This report describe and compare the qualitative data about "soft skills" gathered through focus groups carried out in 9 partner country: Belgium, Finland, France, Germany, Greece, Italy, Poland, Spain, UK.

The aim of Focus Groups meetings was to find out what we mean by "soft skills" and if they are recognized in partner countries and to check which soft skills are really important and needed in labour market, in which areas students and young workers have biggest gaps and what should be done to change this situation.

Focus Group meetings were organised with 2 stakeholders groups:

1. Students (especially closed to graduation) and young workers (FG1)
2. Employers, HR managers, teachers (FG2)

In each partner countries the same set of questions was used during meetings to make it possible to compare results and situation in all countries.

In the report we present results of meetings with both groups and general conclusions.

Self-evaluation tool: an online questionnaire for students' self-assessment of soft skills and digital soft skills resulting in a "Personal development plan".

O*rientation tool for students and young workers*: a coordination tool specifically being developed for the students, who will approach their personal development in soft skills and soft skills 2.0, drawn on the results produced within the project primarily the Comparative analysis on state of the art of soft skills and soft skills 2.0, the 2 rounds of Focus groups.

Personal Journal: a template to give a method to students about how to learn autonomously and further develop themselves and to evaluate the whole learning path held through the MOOCs.

Lesson learned kit: a set of recommendations targeted at different groups, with a collection of all the experience developed within the project, with a particular attention to the filled evaluation of the students' learning experience and the tutoring and monitoring of the students' path.

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CARE RISK

ARMAZEG

Developing Tools for Lifelong Learning in the Transcaucasus Region: e-Learning

Website: http://www.armazeg.com/en

Runtime: December 2013 – November 2016

Supported / co-funded by: Tempus

Partners: Katholieke Universiteit Leuven, BE (coordinator); State Engineering University of Armenia, AM; Ministry of Education and Science of the Republic of Armenia, AM; Institute of Informatics & Automation Problems of NAS RA, AM; Orbeli Institute of Physiology of NAS RA, AM; Armenian State Pedagogical University after Kh. Abovian, AM; St. Andrew the First-Called Georgian University, GE; Georgian Technical University, GE; Università degli Studi di Firenze, IT; University of Granada, ES; European Distance and E-Learning Network, UK; Ivane Javakhishvili Tbilisi State University, GE.

Project representative to be contacted for further info: Ilse Op de Beeck (ilse.opdebeeck@KULEUVEN.BE)

Financed by the European Commission within the TEMPUS program the ARMAZEG project aims to stimulate educational reform in Armenian and Georgian partner universities by establishing e-Learning centres and training for their staff members – with special attention to lifelong learning methodologies.

The project involves twelve partners from Europe and Transcaucasia with a clear vision to establish new links in the educational sphere between the two regions. With the assistance of four European partners ARMAZEG's Armenian and Georgian institutions will import and adapt e-Learning practices in their educational agenda to realise a flexible organisation of higher and adult education locally. A thorough needs analysis accompanied by study visits to the state of the art European universities will help the Transcaucasian partners improve learning by supporting student-centred methodologies, support research-based higher education and enable the internationalisation of their higher education services.

Amongst the most important outcomes of the project will be the establishment of e-learning centres in 7 partner universities of Armenia and Georgia and the implementation of pilot projects in different disciplines. To ensure the sustainability of the concept in Transcaucasian partner institutions, the project also includes, besides the above mentioned policy makers' study visits, trainings of trainers and regional and national workshops.

Main target groups of the project:

Higher education stakeholders (University management, lecturers, administration staff, students)

Significant public results:

- Documents:
  - State-of-the-Art report on Armenian and Georgian e-learning (available)
  - Policy recommendations regarding e-learning and ICT for LLL in Armenia and Georgia
  - Long-term capacity building strategy regarding e-learning competences for staff
  - Quality assurance framework for e-courses

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CARE RISK

- Established e-learning centres with trained staff and specific business strategy
- Training material for teachers regarding e-learning and ICT for lifelong learning
- Pilot projects (implemented e-courses)

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INNO MLS RISK STRU

LeHo

Learning at Home and the Hospital

Website: http://www.lehoproject.eu/

Runtime: January 2014 – December 2016

Supported / co-funded by: LLP-KEY3 Networks / 543184-LLP-I-2013-I-IT-KA3-KA3NW

Partners: FPM: Fondazione Politecnico di Milano, IT (applicant, University of Perugia – Department of Education and Human Sciences, IT, Bednet vzw, B, Staatliche Schule für Kranke München, D, MMB – Institute for Media and Competence Research, D, EDEN: European Distance and E-Learning Network, UK, FUNDITEC, ES, Leicester Children's Hospital School, UK, Children's Cancer Hospital, EG

Project representative to be contacted for further info: Matteo Uggeri (matteo.uggeri@polimi.it)

LeHo - financed by the Lifelong Learning Programme of the European Commission - is developing an online hub that will provide tools and resources for those engaged or involved in home and hospital-based education for children with medical conditions. The initiative is coordinated by the Fondazione Politecnico di Milano and involves 9 organisations that include universities, hospital schools, IT solution providers and European networks.

In the first phase of this 3-year project, a definition of the key educational factors and highlighting good practice in the field are the initial outcomes that will be used to access further aims, such as providing a Practical Guide and a Toolkit for everybody involved in Home and Hospital Education (HHE) including medical staff, nurses, volunteers, teachers, parents, etc. By the end of the project, the resulting resource will target the policy makers and will conclude the experiences of the participants and contributors of LeHo, highlighting strengths, challenges and weaknesses that may require further development across the partner countries.

The LeHo online hub is already available and open for everybody involved and interested in the topic and includes resources that are being developed or collected by the LeHo team. A Board of Experts was founded in order to support LeHo's work. Members of the BoE include professionals with a high level of experience in the field of HHE who also take on a liason role between the teachers, medical staff and the decision makers at policy level. Focus group discussions are and will be also presented on the online hub.

Main target groups of the project:

- teachers already involved or potentially involved in HHE;
- other personnel/workers of schools not directly involved in the education process:
- technicians (IT administrators, usually) in charge of ICT structures (from computers to webcam to printer, scanners or cables...)
- medical staff (nurses, doctors...)
- volunteers and volunteers associations;
- students, not only with medical needs but in general: this is because in many cases the students themselves are the main 'engine' and helpers for their classmates with medical need and even for their own teachers, especially in the use of technology.

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- schools directors and decision makers (in hospitals and schools): 90% of the times any project of home tuition or in general variations in the normal teaching path has to be evaluated and accepted by the school and hospital decision makers;

Secondary target:

- policy makers;
- representative of institutions related to education (at local, regional and national level);
- parents and parents associations;
- supporting institutes providing ICT solutions (i.e. Bednet (Be), KlasseContact (Nl), PSO (ITA)...;
- high and higher education students representatives;
- students with a disability: even if the focus is not specifically on them, we need to take into account the needs of people suffering from some specific form of disabilities (e.g. special high contrast, bigger letters, audio transcriptions of videos, etc.)

Significant public results:

The LeHo online hub, including international and national communities: http://www.lehoproject.eu

LeHo on Facebook: https://www.facebook.com/groups/677222725654610/

LeHo on Linkedin: http://www.linkedin.com/groups/LeHo-Learning-Home-in-Hospital-4966339

Examples from the LeHo Repository's content:

- LeHo Board of Experts and their report on the state-of-the art of HHE in their country
- First Focus Group Discussion Report
- Glossary of terms in use in the Home and Hospital Education
- LeHo International Community
- Training action at HOPE in Vienna

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QLTY VWC

SeaL

Seamless Learning in Lake Constance Region

Website: not available yet

Runtime: 01.2017 – 12.2020

Co-funded by: EU / Interreg V (50-70% funding quota)

Partners: Zurich University of Applied Sciences, Switzerland (Coordinator) (https://www.zhaw.ch/en/university); NTB University of Applied Sciences of Technology Buchs, Switzerland (http://www.ntb.ch/ntb-homepage.html); University of St. Gallen, Switzerland (http://www.unisg.ch/en); Albstadt-Sigmaringen University, Germany (http://www.hs-albsig.de/studium/auslandsamt/english/Seiten/Homepage.aspx); Hochschule Konstanz University of Applied Sciences, Germany (http://www.htwg-konstanz.de/Welcome-at-Hochschule-Konstanz.en.0.html).

Project representative to be contacted for further info: Christian Rapp (rapp@zhaw.ch)

Projects under the EU Interreg-V funding shall foster (a) sustainable cross-border research collaboration within specific thematic areas, (b) linking of academia with business and public administration, and (c) innovation appropriate to the Lake Constance region[1].

To address the aims, this overarching project will utilise a design-based research approach with cross-border cooperation to develop, implement and evaluate various seamless learning (SL) higher education projects, in both the social and natural sciences across the Lake Constance region.

Rationale for the project: Most of the project partners are universities specialising in Applied Sciences, preparing students for working in commercial sector companies, with many students in part-time employment. Most partners also cooperate with commercial enterprises for R&D and/ or consulting, with some of these companies part of the consortium as business partners. Company employees, students and commercial businesses often feel there is a breach between the two contexts – that is, learning in a higher education institution, and learning or applying knowledge in a business context. In particular for students employed part-time, it would be desirable to embrace their commercial knowledge, skills and experience within the education context to apply during their studies as a means to enrich and deepen the learning processes. More generally, a seamless flow of learning, application and exchange of experiences between an applied HE context and commercial business seems mutually beneficial in various respects.

Conceptual framework of the project: Seamless learning, made popular in particular by Lung-Hsiang Wong, as a concept focuses in particular on "the continuity of individual learners' learning experience across multiple learning spaces, particularly to connect formal and informal learning spaces" (Wong, 2015; p.5). The defining feature of SL as a learning approach is the "*bridging* of cross-space learning efforts" (p.33); therefore, SL seems particularly suitable as a conceptual framework for developing solutions to bridge or address the breach, as relevant to the project, between the worlds of Higher Education and commercial enterprise.

Structure and design of the project: SeaL consists of various sub-projects in different fields, reporting into an overarching base project managed throughout the whole project period. The base project will be run by instructional designers and experts in instructional technology including programmers who will support the sub-projects in their developing and implementing of SL approaches tailored to their respective requirements. A design-based research approach will be utilised within which prototypes for the

[1] Eligible countries: Germany, Austria, Switzerland, Liechtenstein.

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subprojects will be developed, implemented, evaluated, and were necessary, refined accordingly. The project will commence with two subprojects: (a) "Modelling and Visualisation realised as Seamless Learning and Working in STEM subjects and economy with decentralised energy systems as a concrete example"; and (b) "Network for Training and Knowledge Exchange in Geometrical Product Specification and Verification". Further projects are at the proposal and preparation stage, approached under agile project management.

Main target groups of the project: Practitioners from HE institutions and companies that want to implement seamless learning within their institutions, companies. Researchers interested in seamless learning. Students that could benefit from an improved learning experience.

Significant public results: The project expects results and insights within the following areas: (a) Application of SL in HE, with a focus on applied sciences functioning as a bridge between academia and commercial business; (b) Specific requirements arising for SL application in Lake Constance region including trans-national application; (c) Potential and limitations of a design-based research approach for developing SL prototypes; (d) Assessment (formative, summative) of SL projects; (e) Electronic infrastructure for SL projects, allowing for ubiquitous learning, for application in HE and business contexts (in part, new software will be developed); (f) Each of the subprojects will result in one SL pilot that has been implemented, tested and refined; and (g) Adding to the state of knowledge of SL as a conceptual framework.

Wong, L. H. (2015). A Brief History of Mobile Seamless Learning. In L. H. Wong, M. Milrad, & M. Specht (Eds.), *Seamless learning in the age of mobile connectivity* (pp. 3-40). Singapore: Springer.

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